

The AWA Journal

Quarterly Bulletin of the Antique Wireless Association®

Autumn 2013, Vol. 54 / #4



Cutting the ribbon to open the new Antique Wireless Association Museum were (from left, in foreground): New York State Senator Ted O'Brien, New York State Assemblyman Brian Kolb, Special Guest Marge Schaumleffel and (not shown) Town of East Bloomfield Supervisor Dodie Huber and Museum Deputy Director Bob Hobday.

Richard Neidich photo.



Published for the radio collector,
historian, restorer and all vintage
communications enthusiasts.

**CONVENTION 2013
RETROSPECTIVE ISSUE**

Originally published as

THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION™

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Website: www.antiquewireless.org

Special Conference Website: www.awaconference.com

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Equipment Awards.....Geoffrey Bourne

J. Albert Moore AwardGeoffrey Bourne
Taylor AwardPete Yanczer
Tyne Award.....Joe Knight
Television AwardRichard Brewster

WHOM TO CONTACT

Please write legibly. Enclosing an SASE speeds replies.

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Dues: \$25 per year in U.S.; \$30 elsewhere. Life membership: \$500 in U.S.; \$600 elsewhere. Make checks payable to "AWA."

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Radio Ramblings

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Radio Rehab 101

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Radio Reproducers

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The Vacuum Tube

Ludwell A. Sibley

The AWA Journal is published approximately four times a year by and for members of the Antique Wireless Association. AWA is a non-profit historical society founded in 1952 and incorporated in the State of New York. The AWA Journal is available through AWA membership. Its issuance is subject to change from time to time as to frequency, content, and size. It is not liable in any way for any buying-and-selling transaction entered into as a result of its content.

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FROM THE EDITOR

First, I have to apologize for the lateness of this issue. My wife went in for knee replacement surgery just after I got home from the Convention and has been undergoing a very difficult and painful recovery ever since. Anyone who has been through that as a patient or caregiver I'm sure will understand how the process can turn one's life upside down.

The 2013 AWA Convention is now history and a lively event it was! As usual, the schedule was packed with presentations on an unbelievable variety of subjects. Sprinkled throughout were the usual fun dining events such as the International Dinner, Pizza Party, Ladies Luncheon, Heath Banquet and Members Social Hour and Banquet. The Book Fair and flea market were well

stocked with tempting wares and the Old Equipment Contest was packed with amazing array of exhibits including many relating to the Convention's Heathkit theme.

But what was arguably the most exciting happening of the event was the opening of the new AWA Museum. Taking part in the ribbon cutting ceremony were dignitaries from the State and Town Governments (see front cover) and the crowds filing through the brand-new corridors and exhibit rooms were treated to music from a string quartet led by Convention chairperson Roy Wildermuth's sister.

Quite a remarkable happening indeed, but I can't wait to see what Roy comes up with next year!

—Marc Ellis, N9EWJ

LETTERS TO THE EDITOR

All letters to the Editor are read with interest and attention, though not all can be published in this column. Letters may be paraphrased, shortened or otherwise edited to fit the available space. The statements made by our correspondents are their own opinions and do not necessarily reflect the views of either the AWA Journal staff or the Antique Wireless Association.

MUSEUM TOUR NOW ONLINE

I recently completed a video tour of the new AWA Museum and put it up on my YouTube channel. Those interested can view it at www.youtube.com/professormikeadams

*Mike Adams, Interim Associate Dean
College of Humanities and the Arts
San Jose State University
Via e-mail*

VINTAGE CATEGORY FOR FIELD DAY

I am writing to ask those members of the AWA who are also amateur radio operators to send a note to the ARRL Field Day com-

mittee asking that a "Vintage Equipment" category or a "Vintage Equipment added point bonus" be included in the Field Day rules beginning with next year's (2014) event. The e-mail address that should be used is fieldday@arrl.org.

There has been much ongoing discussion regarding this issue on several of the forums with which I am connected.

The consensus seems to be that doing this would entice back into this event many of us Old Timers who recall with fondness our Field Day exploits of prior years.

*Kenneth G. Gordon, W7EKB
Member, AWA and ARRL*

ABOUT OUR AUTHORS

P.A. KINZIE

Development of the Universal, Honeycomb, and Duolateral Coils for Radio Applications

Like many of us, Kinzie became fascinated with all things electrical as a pre-teen. He began serious reading on the subject and acquired an interest in crystal radios that is with him today.

He graduated from the University of Colorado in 1952 with a BS in Engineering Physics, then got a job in test engineering at Convair, later a division of General Dynamics, in San Diego. While working full time he enrolled in a night school graduate degree program at UCLA, earning an MS in Engineering in 1959. At Convair, he became responsible for the installation and operation of ground-test instrumentation in support of new aircraft development tests for the Air Force and the Navy. Later this included early development testing for the Atlas ICBM program.

Kinzie continued at Convair until 1962, and then moved to Rocketdyne's Research Department near Los Angeles. Development of the large liquid propellant rocket engines for the Apollo Project was well under way at that time, and he developed sensors and calibration equipment for measuring the high temperature and heat flow conditions produced in the engines. This effort continued until after the first lunar landing in 1969.

During the 1970s Kinzie was employed at two other engineering companies and wrote a book on thermocouples for temperature measurement (published by John Wiley & Sons in 1973). After 1980, he worked in a non-technical field that gave him more time for crystal radio experiments and his studies of early radio history. He is a long-time member of AWA and a life member of the Arizona Antique Radio Club. He has written for the Arizona

Club's Newsletter as well as the Xtal Set Society. The latter organization published his book *Crystal Radio: History, Fundamentals, and Design* in 1996.

ERIC P. WENAAS

Researching the Real Inventor of Radio Telegraphy

Eric Wenaas has had a lifelong passion for antique radios, beginning with his first Radiola and crystal set given to him by family friends as a young man growing up in Chicago. He experimented with radio devices and repaired radios and televisions as a hobby while in high school. He then studied electrical engineering at Purdue University, graduating with B.S. and M.S. degrees. Wenaas went on to the State University of New York (SUNY) at Buffalo where he earned a Ph.D. degree in Interdisciplinary Studies in the School of Engineering. After graduating, he spent most of his career at Jaycor, a defense company in Southern California—first as an engineer and later as the President and Chief Executive Officer.

Upon his retirement in 2002, he set out to research the early days of wireless and document interesting historical vignettes based on original materials of the era. He has written numerous articles for the *AWA Review*, the *AWA Journal* and *Antique Radio Classified*. In 2007, he published the critically acclaimed book *Radiola: The Golden Age of RCA—1919-1929*. It covered the early history of RCA and included the formative years of the Marconi Telegraph Company of America. For this work, he received the AWA Houck Award for Documentation in 2007. He is a lifetime member of the AWA and a past member of both the IEEE and the American Physical Society. Dr. Wenaas resides in Southern California and continues to enjoy collecting radios, researching the early days of wireless and writing articles.

MEMBERSHIP NEWS



AWA JOURNAL POLICY ON PROMOTING EVENTS: The *AWA Journal* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Send your information to Marc Ellis, Editor, *AWA Journal*, P.O. Box 1306, Evanston, IL 60204-1306. E-mail mfellis@alum.mit.edu. Closing date is six weeks prior to first day of month of issue.

Event Information

AWA ANNUAL CONVENTION

Week of August 11

Theme: Hallicrafters. More information coming when available.

News Briefs

WENAAS RECEIVES STOKES AWARD

Eric Wenaas has received the 1913 Tube Collector's Association Stokes Award For Authorship. Wenaas wrote the definitive *Radilola: The Golden Age of RCA*, as well as significant studies in *The AWA Review* on the history of wireless detectors and the legal struggles and victories of Elmer Cunningham.

AWA BOOTH ATTRACTS ATTENTION AT SBE CONFERENCE

Jim Kreuzer, with museum volunteers Sandy and Caroline Macmillan, manned an AWA booth at the Society of Broadcast Engineers Conference held at Verona, NY on September 25. The display attracted a lot of attention, with many attendees showing strong interest in our organization.



The AWA Booth at the SBE Conference.

MURRAY TO CONTINUE AS REVIEW EDITOR

Bob Murray, who had originally planned to leave his post as Editor of *The AWA Review* after publication of the current issue, was invited to stay on and has accepted. Manuscripts may be sent to his address in Vancouver or his e-mail address, both of which are to be found on the inside front cover of this *AWA Journal*. He is looking forward to receiving manuscripts for the next issue.

COHERERS AS MEMRISTORS

Member Varun Aggarwahl writes that the coherers used by Marconi at his 1901 transatlantic radio receiving station could be considered memristors because they change their resistance when a wireless signal induces a current within them. Modern memristors are being used for building highly dense memories—even emulating a brain. Recent articles in *IEEE Circuits and Systems Magazine* and *The arXiv Archive* have pointed out that Indian Scientist Jagadish Chandra Bose (1858-1937) had observed all the characteristics of the coherer qualifying it as a memristor while British Physicist William Eccles (1875-1966) had

developed its mathematical model. Bose had seen that the coherer memory could not only be written electrically but also erased by electrical signals. All other scientists believed that erasure required mechanical tapping. Eccles, on the other hand, modeled the coherer as a ther-

mistor with variable resistance, which is a classical model for the memristor. For more information visit www.mlabs.in/memristor.

JOHN DILKS' SON PUBLISHES NOVEL

Writing under the pen name Corbin Coltrane, member John Dilks' son, KB2CIX, has just published a novel. It's titled "Entanglement: an International Spy Thriller" and amateur radio plays a key part in one chapter. The novel is available in either paperback or kindle editions at <http://www.amazon.com>.



Recurring Meetings

- The Antique Radio Club of Illinois (ARCI) — Meets bi-monthly. Meets generally held at the American Legion Hall, Carol Stream IL but meets in June in conjunction with the 6-Meter Club of Illinois at the DuPage County Fairgrounds and once per year for Radiofest at the Willowbrook Illinois Holiday Inn. Check website for schedules, details and maps.) Contacts: President, Olin Schuler oshuler@comcast.net; Club Public Contact, Art Bilski, 630-739-1060, clubinfo@antique-radios.org. Website www.antique-radios.org.

- Antique Radio Collectors of Ohio — meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: \$10.00 per year. For more info, contact Karl Koogler: mail to above address; phone (937) 294-8960; e-mail KARLKRAD@GEMAIR.COM.

- California Historical Radio Society — For info on current meetings, call the CHRS hotline: (415) 821-9800.

- CARS, the Cincinnati Antique Radio Society — Meets on the third Wednesday of each month at Gray's History of Wireless Museum, which is part of The National Voice of America Museum of Broadcast-

AWA LIFE MEMBERSHIPS ARE NOW AVAILABLE



Cost: \$500 (U.S.), \$600 (elsewhere.) Make out your check to Antique Wireless Association and send it to AWA Membership, P.O. Box 421, Bloomfield, NY 14469-0421. E-mail awamembership@rochester.rr.com.

ing, Inc., located in a building that is now on the National Historic Register at 8070 Tylersville Road, Westchester, Ohio. 45069. For more information contact Bob Sands at (513) 858-1755.

- Carolinas Chapter of the AWA — Hosts four "mini-swap-meets" each year (in January, May, July and October) plus an annual conference, "Antique Radio Charlotte," on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the website at CC-AWA.ORG or contact Ron Lawrence, W4RON, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail W4RON@carolina.rr.com.

- Central Ohio Antique Radio Assn. — Meets at 7:30 p.m., third Wednesday of each month at Devry Institute of Technology, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B.) Contact: Barry Gould (614) 777-8534.

- Delaware Valley Historic Radio Club — Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: \$15.00, which includes a subscription to the club's monthly newsletter *The Oscillator*. For more info contact Delaware Valley Historic Radio Club, P.O. Box 5053, New Britain, PA 18901. Phone (215) 345-4248.

- Houston Vintage Radio Association (HVRA) meets the fourth Saturday (January thru October) at Bayland Park 6400 Bissonnet, 9 a.m. in SW Houston. Each meeting includes an auction and program. Annual two-day convention held in February includes three auctions, old equipment contest, technical talks, swap meet, and awards banquet. One day MEGA auctions held in the spring and fall. A newsletter, *The Grid Leak*, is published bi-monthly. Event postings, announcements, photos and

other features are available on HVRA website: www.hvra.org. Membership is \$20/yr. Address: HVRA, P.O. Box 31276, Houston TX 77231-1276 or call Bill Werzner, 713-721-2242; email: werz1943@gmail.com.

• Hudson Valley Antique Radio and Phono Society [HARPS] meets the 3rd Friday of the month 7:30PM at the Episcopal Church of Suffern Annex, 65 Washington Ave., Suffern N.Y. 10901 for info contact Rev. Dale Cranston at (845) 357-1615 or dale.cranston@gmail.com.

AWA NETS

(EASTERN TIME)

PHONE

SUNDAY:

7237 kHz, SSB, noon (NCS: various);

3837 kHz, AM 4:00 p.m.

(NCSs: KA2J & W2AN)

(Also runs on Sat.—same time)

MONDAY:

1945 kHz $\pm$, SSB or AM, 8 p.m., (NCS Joe Cro, N3IBX)

TUESDAY:

14274 kHz, SSB, 2:30 p.m. (NCSs: KC3YE and W0FXY)

3837 kHz SSB, 8 p.m. (NCS: WB2SYQ)

MONDAY-WEDNESDAY-FRIDAY:

The AWA Bruce Kelley HF Net

3837 kHz $\pm$ kHz, SSB, 9:30 a.m. NCS: Mon.

W3JW; Wed. WA2TWS; Fri. WA3DSP

CW

DAILY, 4 p.m., 3588 or 7050 kHz. Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see what you stir up. First WEDNESDAY of each month, 8 p.m., 7050 kHz

2-M REPEATER (Rochester Area)

MONDAY, 7:00 p.m. (NCS: N2WZS)

Receive 145.110 MHz

Transmit 144.510 MHz

110.9 PL

REGIONAL MEETING REPS

California.....Floyd Paul, W6THU

CanadaTo Be Announced

D.C. AreaPaul Mooney, K4KRE

Indiana.....Herman Gross

New York.....Ronald Roach

Carolinas Chapter.....Ron Lawrence, W4RON

Texas.....David Moore (Houston)

• Indiana Historical Radio Society — Active since 1971. Meets in Feb. (Lawrence), May (2-days, Kokomo) and Oct. (Greenfield). Flea market, old equipment contest, and auction at all events. Meet details and club info at website www.indianahistorical-radio.org. \$15.00 annual dues includes the IHRS Bulletin published quarterly. Contact Herman Gross, W9ITT, 1705 Gordon Dr., Kokomo, IN 46902, 765-459-8308, email w9itt@comcast.net.

• London Vintage Radio Club — This Ontario, Canada club meets in London on the first Saturday of January, March, May, and November. Annual flea market held in Guelph, Ontario in June. Contact: Dave Noon, VA3DN, 19 Honeysuckle Cr., London, ON N5Y 4P3, Canada. Email: va3dn@execulink.co. Website: <http://lvrc.homestead.com/index.html>.

• Mid-Atlantic Antique Radio Club (MAARC)—Meets monthly, usually on the third Sunday of the month at the Davidsonville Family Recreation Center in Davidsonville, MD. (But meets once or twice a year in Northern Virginia—check website for schedules, details and maps.) Contacts: President, Steve Hansman, 855 Arundel Drive, Arnold, MD 21012, (410) 974-0561, email: shans01a@comcast.net; Membership Chair, Geoff Shearer, (703) 818-2686, email: gshearer2@verizon.net. Website www.maarc.org.

• The New Jersey Antique Radio Club Meets the 2nd Friday of the month 7:30 pm at either Info Age 2201 Marconi Rd. Wall Township N.J. 07719 or Bowen Hall, Princeton University. We hold three annual swap meets and four seasonal repair clinics. Visit the club's website for details www.njarc.org

or contact NJARC President Richard Lee (914) 589-3751 or president@njarc.org.

- Northland Antique Radio Club (Minneapolis/St. Paul)—hosts four events with swap meets each year (in February, May, September and November) including an annual conference, “Radio Daze,” for two days in mid-May. Annual dues are \$12.00, which includes a subscription to the club’s quarterly newsletter. For more info, visit our website at www.northlandantiqueradioclub.com.

- Northwest Vintage Radio Society — Meets the second Saturday of each month at Abernethy Grange Hall, 15745 S. Harley Ave. Oregon City, OR. Meeting starts at 10:00 a.m. Membership \$25.00 per year. Guests welcome at all meetings and functions except board meetings. Spring show, the second Saturday in May. For more information, contact Mike McCrow 503-730-4639; e-mail: tranny53@comcast.net.

- Oklahoma Vintage Radio Collectors— Meets second Saturday of each month, (except for April, October, and December), at Hometown Buffet, 3900 NW 63rd St., Oklahoma City, OK. Visitors welcome. Dinner/Socializing, 6 p.m., meeting, 7 p.m. Swap meets on second Saturday in April and October at 8 a.m., Midwest City Community Center, 100 N. Midwest Blvd., Midwest City, OK. Membership \$15/year including monthly *Broadcast News*. Info: contact Jim Collings at (405) 755-4139 or jrcradio@cox.net. Website: www.okvrc.org.

- Ottawa Vintage Radio Club — Meets monthly (except June and July) in the Conference Room, Ottawa Citizen, 1101 Baxter Rd., Ottawa, Ontario, Canada. Contact: Lea Barker

at (613) 829-1804 or check www.ovrc.org. Membership: \$10 Canadian/yr.

- The Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea markets, contests and clinics held at least four times yearly. A fall auction is included in September and our annual luncheon program is on the first Saturday in December. An annual Tri-State Radio Fest is held in April. Our journal, *The Pittsburgh Oscillator*, is mailed quarterly. For more information visit us at <http://www.pittantiqueradios.org>, email President Chris Wells at radioactive55man@comcast.net, or phone Treasurer Tom Dixon at 412-343-5326.

- Society for Preservation of Antique Radio Knowledge (SPARK) — Meets monthly at Donato’s Pizzeria, 7912 Paragon Rd., Centerville, OH. Annual swap meet. Membership, \$18/year. Write SPARK Inc., P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call John Pansing at (937) 299-9570.

- Texas Antique Radio Club — Meets alternate months in Kyle and Shertz, TX. Contact: Doug Wright, 625 Rolling Hills Dr., Canyon Lake, TX 78133. Email: dwjw@gvtc.com; website www.gvtc.com/~edengel/TARC.htm.

- Vintage Radio and Phonograph Society (VRPS) meets monthly on the third Saturday. Located in the Dallas, Fort Worth Metroplex, our current activities are annual convention, auctions, swap meets, repair training sessions and monthly programs. For details visit our website www.vrps.org, or by contacting VRPS President Jim Sargent at (817) 573-3546 or bsargent@swbell.net. 📺

50TH ANNIVERSARY COMMEMORATIVE BOOKLET

Our 50th anniversary commemorative booklet *Fifty Years of AWA* has received high marks from everyone who has seen it. We still have a stock of this profusely-illustrated 60-page AWA history available for those who would like extra copies or those who were not members at the time of distribution and didn’t receive one. Cost is \$7.00 per copy postpaid, no limit. But once they’re gone they’re gone—so act now if you are interested! Send your check to Antique Wireless Association, Box 421, Bloomfield, NY 14469-0421.



AT THE MUSEUM

Visit us on the Internet at <http://www.antiquewireless.org>

MUSEUM MANAGEMENT AND STAFF

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Robert Hobday, N2EVG
Deputy Director

Bruce Roloson, W2BDR
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Accession Committee Chairman

Ronald Roach, W2FUI
Operations Manager

Lynn Bisha, W2BSN
Associate Curator
Registrar

Felicia Kreuzer, KA2GXL
Assistant Curator

James Kreuzer, N2GHD
Assistant Curator
Media Librarian

Roy Wildermuth, W2IT
Assistant Curator

Ed Gable, K2MP
Curator Emeritus
Historian
Assistant Registrar

Stan Avery, WM3D
Treasurer
Museum Store Manager

MUSEUM CONTACT

For all inquiries about the Museum and its operation, contact Museum Curator Bruce D. Roloson, W2BDR, Curator, P.O. Box 478, 2 Walnut Place, Apalachin NY 13732, e-mail broloson@stny.rr.com. *The AWA Electronic Communication Museum is an IRS 501(c)3 charitable organization.*

From Bruce D. Roloson, W2BDR, Curator, AWA Museum

August 20th was the Grand Opening of the new AWA Museum. What a day! This was the culmination of hard work by the more than 20 volunteer staff members. Since 2006 we have moved in the extensive collections from the Academy (Old) Museum, the Annex, and several other sources. The creation of the new museum gives AWA a quantum leap to the status of a world class institution. We invite you all to go to the new website [antiquewireless.org](http://www.antiquewireless.org) to take a virtual museum tour and see the opening day. Thanks to all who have played a role in making this happen.

Our International Dinner was also held on the opening day. It took place at the Holloway House Restaurant just up the road from the old museum. We did this to bring back some memories for those who had attended the opening of the Academy (Old) Museum and conferences of times gone by. We all had a great time welcoming our International guests.

The 2013 Annual Convention, Roy Wildermuth, Chairman, also started the same day. As soon as the International Dinner was over we moved to the RIT Inn to prepare for starting the rest of the convention in the morning. Lynn Bisha introduced the world class programs that were presented throughout the event. They were given by Anders

Widell (The Radiomuseum in Jonkoping, Sweden); Bengt Svensson (highlights from Some of the Early AWA Conventions); Paul Jason, K2FX (Modern Radio); Dan Bedford (A Discussion of Radio Collecting in Australia); Mike Molnar (Hazeltine & the Neutrodyne); Mike Adams (A Conversation with Eleanor de Forest); Bart Lee (Radio Archeology); Tom Perera, W1TP, Moderator for the Key & Telegraph Seminar; Prof. Franz Pichler (The Cooke/ Wheatstone



State Senator Ted O'Brien speaking at the dedication of the new museum. Flanking him are Bob Hobday, AWA Museum Deputy Director (left) and Bruce Roloson, Museum Curator. The console radio was pressed into service by some speakers as an impromptu podium.

Telegraph); Ivor Hughes (Telegraph News Pioneer Daniel H. Craig); Bill Burns (Atlantic Submarine Telegraph Cable Broad-sides); Gil Shlehman (Semi-Automatic Keys); Marc Ellis (Moonlight Restorations Seminar); Tom Perera (A Major Talk on the Enigma); Roy Wildermuth (From Mule to Man); Richard Brewster (WWII Television System); Lauren Peckham and Felicia Kreuzer (Pre-1912 Wireless and Electrical Apparatus Seminar).

The Contest (organized by Geoff Bourne and Chris Bacon) with its Heathkit theme was great and was one of the largest we have had. We got to see a lot of interesting Heathkit equipment, including Tom Peterson's O-1 oscilloscope, one of the two known to exist; Dave and Julia Bart entered a display of Lincoln's Telegraph; Roy Wildermuth put W2AN on the air; Michel Chabot brought those beautiful Westinghouse bright colored sets, just to name a few of the displays.

Rich Estes and his staff ran the Auction and we were pleasantly surprised by the rare items available. By the way, many of the people working the auction and registration are the same staff members who do the day to day operations at the Museum.

Hallicrafters Radio will be the theme of the 2014 Convention, which will take place during week of August 11th.

Now for our new project: In order to begin construction of the next section of the museum, we need to move elsewhere the portion of the collection temporarily stored in the back of the museum building. We are raising funds to purchase the complex to the north of the museum on the opposite side of Rt. 5&20. The complex contains a very large (24,000 cubic feet) storage building with ceilings up to 22 feet high and a 6-inch re-enforced concrete floor. This building is heated and has insulation with a factor of 40.

There is an attached office building completely outfitted with furniture. The 1.5 acre lot is large enough to build a build-



As always, the artifacts displayed at the pre-1912 Wireless and Electrical Apparatus Seminar drew a lot of interested viewers.

ing the size of the Museum. At present we have about half of the \$400k needed to purchase the complex. If all our members would contribute to the Museum Fund we could complete the purchase and move on to the next phase of museum construction.

***From Ron Roach, W2FUI,
Operations Manager, AWA Museum***

The AWA membership and the Tuesday volunteer group have lost a dedicated volunteer with the passing of John Atwood on Sunday, August 25th. When the AWA added the Gauss Road staging building to the campus in 2009, I asked John if he would assume responsibility for designing the large Tech Center at the building. By the afternoon of my request John had already sketched the outlines of a center dedicated to general repair, military, audio and

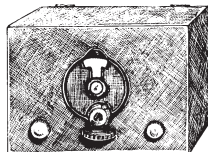
(continued, page 22)



We have about half the funds on hand needed to purchase this ample and much needed storage facility, with attached office building, right across the road from our museum complex. Your contribution to The Museum Fund will help put us over the top.

AMATEUR RADIO

EDITED BY TIM WALKER, W1GIG, 19 WOODSIDE AVE., WESTPORT, CT 06880,
W1GIG@ATT.NET, PLEASE INCLUDE SASE FOR REPLY.



Coming Events

Greetings to all

Now that we are home again after the 2013 annual convention it is time to address you with news of the affair as well as planning data for the winter events.

Judging by the happy faces I observed, the convention was a success. The presentations were excellent, the contests full of treasures, and the flea market full of bargains. Attendance was about what it was last year, but seemed a bit more active. The auction was well attended and went quickly. At the Amateur Meeting we congratulated the winners of the past season and talked a bit about the issues of scheduling our events to stay away from big time contests and yet fit into the schedule of the *Journal*. I can tell you, it is a bit of a balancing act.

Following is the schedule for the four events for 1014, and the rules and invitation to the last event of 2013, The Bruce Kelley QSO Party in December, and the first of 2014, The Linc Cundall CW Contest in January. This information is also on the website along with log sheets for each event. If you don't have internet access, send me a note or postcard and I will print and mail them to you. Or, simply use what you have from prior years. Remember that logs are due to the contest managers within 30 days of the contest to make sure that we get them in time for publication. Also photos of your stations are encouraged.

C U on the Air
Tim

Antique Wireless Association Schedule of 2014 On-The-Air Events

Full details on each of these events will be available on the AWA website during the month preceding the event, or earlier, if available. For additional information contact Tim Walker. Good luck and have fun!

Event: AWA Linc Cundall Memorial CW Contest

Dates: Wed. Jan. 15 @ 2300 GMT to Thu. Jan. 16 @ 2300 GMT and Sat. Jan. 18 @ 2300 GMT to Sun. Jan 19 @ 2300 GMT

Bands: 160, 80 and 40 Meters. Note that 20M has been dropped.

Special Conditions: Contest designed to favor those using low power and equipment constructed before 1950. But, all are welcome, AWA members and visitors both. High scorers should send in full details on equipment and station photos. Get that WW II surplus on the air! Logs are due four weeks after contest.

Event: AWA Amplitude Modulation QSO Party

Date: Sat. Feb. 08 @ 2300 GMT to Sun. Feb. 09 @ 2300 GMT

Bands: 160, 80, 40 and 20 Meters

Special Conditions: AM is required. All ages of equipment and all power levels. Extra credit for working one or more Flagship Stations, typically W2AN (AWA) and W1HRX (Millen's personal call). Please send us a log so we know who is out there. They are due four weeks after the event.

Event: AWA John Rollins Memorial DX Contest

Dates: Wed. Mar. 05 @ 2300 GMT to Thu. Mar. 06 @ 2300 GMT

And Sat. Mar. 08 @ 2300 GMT to Sun. Mar. 09 @ 2300 GMT

Bands: 40 and 20 Meters

Special Conditions: CW contest designed to favor those using equipment constructed before 1960 with straight keys. But, all are welcome, AWA members and visitors both. High scorers should send in full details on equipment and station photos. Logs are due four weeks after contest.

Event: AWA Bruce Kelley Memorial CW QSO Party

Dates: Sat. Dec. 06 @ 2300 GMT to Sun. Dec. 07 @ 2300 GMT

And Sat. Dec. 13 @ 2300 GMT to Sun. Dec. 14 @ 2300 GMT

Bands: 160, 80 and 40 Meters

Special Conditions: Contest is for those who design and build low power self excited oscillators (no crystals!) from the 1920s. Open only to hams using transmitters meeting the requirements, both AWA members and visitors. Design must predate 1929 and use early tubes. Construction to conform to design using the earliest parts available. Receivers, old is better, but not required. High scorers should send in full details on equipment design and station photos. Logs are due four weeks after event. Plaques to be awarded.

The 2013 Bruce Kelley 1929 QSO Party

The Bruce Kelley 1929 QSO Party is a yearly AWA sponsored event where participants build their own transmitters using the designs, techniques, and tubes that were available in 1929 and earlier, and then put those classic transmitters on the air and try to contact as many other 1929 stations as possible. Since they use early designs, it is a cacophony of whooping, chirping, buzzing, clicking, drifting, swishing, swaying, warbling, and other interesting signals. This is what ham radio sounded like in 1929 and for two weekends in December it's 1929 again on the ham bands. Last year sixty seven brave stations ventured down into the hinterlands of 1929! The 1929 QSO Party was started in the early 1990's and championed for many years by Bruce Kelley W2ICE, the AWA founder. Prior to Bruce's passing, he asked his close friend John Rollins W1FPZ to keep the 29 QSO Party going. John Rollins managed the QSO party for many years and renamed it the Bruce Kelley 1929 QSO Party in honor of Bruce. Nine years ago John Rollins asked me to manage the 29 QSO Party for him and Bruce, and to keep the

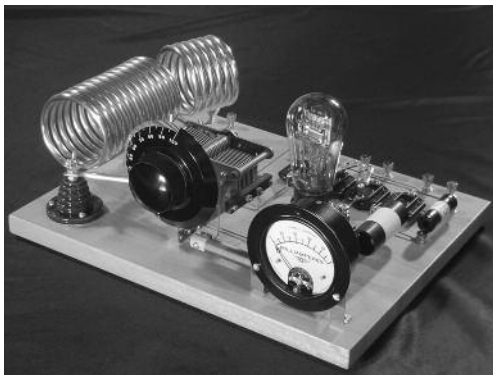
evening alive because it meant so much to both of them.

Dates and Times: First two weekends of December, Saturday Dec. 7 through Sunday, Dec 8, and Saturday, Dec. 14 through Sunday, Dec 15. Starts at 2300Z (6:00 p.m. EST) Saturday night and finishes at 2300Z (6:00 p.m. EST) Sunday night, both weekends.

Objective: Contact as many 1929 stations as possible. Contact exchange consists of RST, Name, QTH (State such as ME or MN or NY), last two digits of the year of the transmitters design or publication (such as 29 or 27 or 23), type of transmitter (such as TNT or TGTP or MOPA or COLPITTS), and power input (such as 6W or 9W).

Rules: Transmitters must be 1929 or earlier types of self oscillators such as the Hartley, TNT, PP tuned grid tuned plate, MOPA, Colpitts, etc. No crystal oscillators. Tubes must have been available during or before 1929. Typical tubes often used are type 10, 45, 27, 211, 71A. Individual stations can be worked only once on each band over the course of two weekends. You can use any vintage or modern receiver that you wish. The event is open to all 1929 stations including non-AWA members and AWA members. You are encouraged to join the AWA and support 1929 radio!

Input Power: Transmitters are limited to a power INPUT of 10 watts or less. However, to help make East-West contacts, power



The transmitter used by Paul Kelly, N1BUG to win the 2012 Bruce Kelley QSO Party.

may be increased to 20 watts INPUT between the hours of 0500Z (12 midnight EST) and 1300Z (8 a.m. EST). Note this is INPUT power. Power input is calculated by multiplying PA plate voltage by total PA plate current. Example: my plate voltage is 300 volts DC, and plate current is 30 ma, so total input power is $300 \times 0.030 = 9$ watts input.

Frequencies: The QSO Party typically operates between 1800 to 1810 KHz, 3550 to 3580 KHz, 7100 to 7125 KHz, plus or minus depending on QRM. Last year 12 brave souls ventured down into the 'hinterlands' of 160 meters for the first time. 40 meter activity is up significantly because it has both night time AND daytime propagation! So when 80 shuts down Sunday morning, I hope to see you on 40m.

Logs: Please submit your log so we can see who you worked and acknowledge your effort! Either electronically email your log to Scott at or mail via post office to: Scott Freeberg WA9WFA, 327 Wildwood Avenue, Saint Paul, MN 55110. Logs *must* be in the 1929 QSO Party log format otherwise it will be difficult to score you. An official 1929 log sheet will be available for download from the AWA website. Or, you can request a log sheet by US mail from Tim Walker (see the column heading for his address). Please do not email logs to any other email address except to the WA9WFA account. Because of email problems in the past, I will acknowledge receipt of all email logs. If you do not receive an acknowledgement within a couple weeks, better check with me to make sure I received it.

Scoring: Remember that contacts with modern stations **DO NOT COUNT**. Only count legitimate 1929 contacts. If you are contacted by a modern station, be polite, mention the AWA QSO Party and point them to the webpage for more information, then move on, or QSO them if you wish. Often QSO Party participants will spare a moment to make a brief modern QSO and 73. We will count contacts with W2AN, the AWA club station. Scoring is simple. Add up the number of legitimate 1929 QSOs. Example: if you make 15 QSOs on 80 me-

ters, 10 QSOs on 40 meters, and 5 QSOs on 160 meters, your final score is 30. All submitted logs will be scored and the results published in the *AWA Journal*. Please submit logs by January 15, 2014.

Good luck to all participants and please send me a photo of your 1929 station. Thanks. 73, Scott WA9WFA

The Linc Cundall Memorial CW Contest

Dates: Wed. Jan. 15 @ 2300 GMT to Thu. Jan. 16 @ 2300 GMT and Sat. Jan. 18 @ 2300 GMT to Sun. Jan 19 @ 2300 GMT

Bands: 160, 80 and 40 Meters

Frequencies: 1.835 to 1.855, 3.550 to 3.580, 7.100 to 7.125.

Concentrate 160 meter contacts on the hour.

Objective: Contact the greatest number of AWA members or other participating stations preferably using pre-1950 gear and low power.

Special Conditions: Contest designed to favor those using low power and equipment constructed before 1950. Home built gear based on pre-1950 designs is also eligible. But, all are welcome. High scorers should send in full details on equipment and station photos. Get that WW II surplus on the air! Logs are due four weeks after contest.

All radio amateurs may participate and submit logs and all are eligible for an award. Non-member stations using pre-1950 gear are welcome. All stations must submit logs to be eligible for an award and are encouraged to send a shack photo showing their vintage station. Electronic format such as EXCEL™ or (PDF, JPG) scans via e-mail are accepted. Use the format posted on the AWA site, or contact WU2D, see below.

Logs/Photos to be submitted to: Mike Murphy, WU2D, 38 North Reading St., Manchester, NH 03104. mjmurphy45@comcast.net

Scoring Details: There are 4 power levels. The 40M frequencies have been shifted up slightly. When calling use "AWA AWA de W3GMS" for example. On contact, exchange signal report, year of equipment

(continued on page 17)



ERIC WENAAS, P.O. BOX 676028, 14813 RANCHO VALENCIA VISTA,
RANCHO SANTA FE, CA 92067, E-MAIL: ERIC@CHEZWENAAS.COM

Books to be reviewed in this column should be sent directly to Eric Wenaas at the address above. After review, all such books become a permanent part of The AWA Library, which is part of The AWA Electronic Communication Museum and is available to members for browsing and research.

The Battery: How Portable Power Sparked a Technological Revolution. By Henry Schlesinger. Printed 2010 by Smithsonian; reprinted 2011 by Harper. Pages: 320; 5½" × 8". Paperback \$16.99, Kindle \$10.67

The unassuming title of this book, *The Battery*, simply does not do justice to its contents. While the title emphasizes the battery, the tag line actually suggests the main theme, namely a history of the technologies sparked by the battery. Author Henry Schlesinger explains the premise of the book by pointing out that there are a number of books about the history, chemistry and physics of batteries, but claiming that they are mainly intended for professionals and academics and that they are “pretty dry stuff.” Conversely, “breathless prose is churned out” for technologies, but by comparison “batteries are generally regarded as somewhat dreary necessities.” Thus, his intent was to draw together the two “disparate and seemingly unrelated elements to tell the story of both,” and what a wonderful story Schlesinger spins.

The author states that the book was written for the nontechnical reader, but I had presumed it was also intended for technical readers, so when I first skimmed through the book, I was expecting to see a few technical details, or at least a few battery specifications such as voltage, internal resistance, total charge (ampere-hours), etc. When I realized that was not going to happen, I settled in and began to focus on the historical aspects of the story. Like a good James Michener novel, Schlesinger begins at the beginning, which in this case is with Thales Miletus in Greece, who in 600BC

discovered static electricity by rubbing amber.

After a short history of the discovery of electrostatic effects of amber and the magnetic effects of lodestones, the story moves quickly to the discovery of the Leyden jar by Pieter van Musschenbroek, a professor at the University of Leyden circa 1746. The Leyden jar was the first true electrical storage device, though it was a capacitor and not a battery.

According to Schlesinger, news of the Leyden jar quickly spread throughout Europe, and while it did not spark a technological revolution, it did create amusement for the royalty and clergy. In a delightful vignette typical of many in this book, Schlesinger describes an early use of the Leyden jar by Nollet, an abbé of a minor order, who “entertained the French king by transmitting a charge through 180 guards...who were all so sensible of it at the same instant that the surprise caused them all to spring at once.”

He goes on to describe the activities of another experimentalist who “managed to send a shock though a mile-long line of Carthusian monks, each holding onto an iron wire.” While no commercial applications were found for the Leyden jar, it was adopted by the scientific community where it was extensively used for the next 150 or so years in many types of experiments.

Schlesinger moves on to Alessandro Volta’s discovery of the first practical battery in 1800, known as the Voltaic Pile. Improved battery designs such as the Wollaston pile and the Daniell and Grove cells followed quickly. However, like the Leyden jar, none of these batteries found commer-

cial application until the commercialization of the telegraph circa 1840.

The Daniell and Grove cells would find use in telegraphy, with the Grove cell being an early favorite among the telegraph companies because of its “*powerful charge of 1.8 volts*,” which was the author’s quaint but imprecise way of stating that it had a higher voltage and current capability than the Daniell cell (1.1 volts).

The early chapters, which focus mainly on the development of the batteries, contain a number of interesting factoids. For example, Schlesinger points out that the positive terminal of the battery is by convention designated the cathode and the negative terminal is designated the anode — just the reverse of the designations of electrodes in a vacuum tube. Schlesinger explains that within both devices the cathode gives up electrons and the anode collects them.

At this point, the book makes a marked change by focusing on the evolution of technologies that resulted from batteries rather than on the evolution of the batteries themselves. The next hundred or so pages—approximately one third of the book—focus on the evolution of the telegraph, telephone, wireless telegraph, and broadcast radio, albeit interspersed with brief descriptions of a few other inventions such as the flashlight, Edison’s electric pen, and quack medical devices. I found the chapters covering communication technologies to be filled with interesting factoids as well, such as the entry of the Eveready Battery Co. into the radio receiver market, probably to enhance battery sales.

The remainder of the book addresses a dizzying array of technologies requiring batteries, from weapon systems developed during WWII to post-war consumer products such as the electric watch, and finally to products using the transistor, integrated circuit and other solid state devices. The author notes that batteries were better suited to power transistors than the AC power line, and the transistor and other solid-state devices vastly increased the applications

for batteries.

Battery development with new chemistries in the solid-state era is covered very briefly in the few remaining chapters. The book ends with a prognostication of where battery development will go in the future. Schlesinger apologizes for the limited number of technologies addressed because of space, but it seems to me he covered more than enough to provide the context for the development of the battery, as he intended.

The book is extremely well researched, the writing style is polished, and the many vignettes are interesting and often reveal the author’s good sense of humor. His occasional references to, and snippets from, classical literature such as Spenser’s *The Faerie Queene* and Melville’s *Moby Dick* add interest and demonstrate his literary skills. Also scattered throughout the book are interesting sketches of batteries, motors, and other devices that help explain the text.

However, there are a few lapses of fact such as found in Schlesinger’s description of Marconi’s transatlantic experiment: “*Then in 1902, using powerful battery arrays, he transmitted his first transatlantic signal from England to Newfoundland—the letter ‘S’ in Morse code.*” By all accounts, Marconi’s experiment occurred in December of 1901 using a 32 horsepower oil engine driving a 25 kw alternator as a power source—not powerful battery arrays.

Schlesinger’s grasp of electrical terms such as current, voltage, and power is somewhat limited, and the resulting phrases involving these terms are often awkward or confused, although the meaning is still quite clear. For example, when he describes how Joseph Henry discovered the need for a relay device in telegraphy because the current becomes too weak to be detected at long distances (due to line losses), he says: “*What he discovered is that current steadily loses its power when transmitted over long distances.*” Whatever minor errors and awkward language there may be in this book, they do not detract from it, and I can definitely recommend *The Battery* as an easy and enjoyable read. Right now it’s

available in good used condition for a few dollars a copy from AbeBooks.com and other secondary sources. As such, it is a veritable bargain.

Also Noted: *History of the Electric Lamp* by Fin Stewart. Published 2013 by Fin Stewart. CD with PDF format, 616 pages. \$A57 (~US \$53) ppd.

After many years of writing, author Fin Stewart has completed his comprehensive book on the history of the electric lamp. It is a scholarly work of 616 pages consisting of 22 chapters divided into four parts: I) Pioneer Lamp Manufacturers, II) Untitled (miscellany), III) Incandescent Lamps for All Purposes, and IV) Gas Discharge Lamps. The main body of the book is followed by five appendices, a bibliography and an index. Unfortunately there are no references, something of a rarity for a

scholarly book.

There are several hundred color photos of lamps alone, mainly from the author's own lifetime collection. There are also many images and drawings of lamps and other associated apparatus, ads, and patent diagrams. The activities of an untold number of companies are included, many of which are familiar to the antique wireless enthusiast as manufacturers of vacuum tubes.

The author has agreed to prepare something of a sampler that you can request by e-mail in order to take a peek between the covers before investing in his book. You can e-mail Fin at or write him at Fin Stewart, 38 Primrose St, Wingham, NSW 2429, Australia. *History of the Electric Lamp* is available only from the author. Payment by PayPal is preferred, but a personal or bank check is also acceptable. 

AMATEUR RADIO, *cont. from page 14*

such as "TX36" for a 1936 transmitter and "RX 34" for a 1934 receiver. Send "MOD" for modern (after 1950) gear. And finally send your Input Power such as "10W". Also send name and state or country.

Equipment Multipliers

MOD TX and RX	1
OT TX or RX	2
OT TX and RX	3

Power Multiplier

0-10 Watts Input	4
10-75 Watts Input	3
75-150 Watts Input	2
150 + Watts Input	1

Examples:

- K8JWR contacts K0CKY
- K8 JWR: TX, Jones P-P at 6 Watts; RX, R390A = One OT, 1 MOD for 2 points.
 - Power Multiplier for 6 Watts is 4

- $2 \times 4 = 8$ points
- K5MO contacts W2AO
- K5MO: TX, Utah UAT-1 80W; RX, 1935 HRO = Both OT for 3 points
- Power Multiplier for 80 Watts is 2
- $3 \times 2 = 6$ points
- N2GIG contacts K3SEW
- N2GIG: TX, HB TNT-Type 10, @ 4W; RX, 6SK7 Regen = both OT for 3 points
- Power Multiplier is 4
- $3 \times 4 = 12$ points
- VE3AWA contacts W7LNG
- VE3AWA: TX/RX, WS-19 MKII Xcvr = both OT for 3 points
- Power Multiplier for 75W is 3
- $3 \times 3 = 9$ points

Determining total points per QSO:

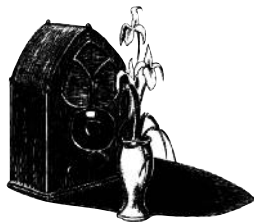
To find QSO points for contact, take your equipment multiplier $\times$ your power multiplier = total points for the contact. Good luck, have fun! 

RECENT RADIO, TV AND ENTERTAINER OBITUARIES

COMPILED BY **CHARLES S. GRIFFEN, W1GYR**

400 SEABURY DR., APT. 4153, BLOOMFIELD, CT 06002-2660

Note: When known, the date of death is indicated in parenthesis.



MERRILL BROCKWAY, 90, (5-2-13) director and producer. Brockway brought many of the 20th century's greatest dancers and choreographers to American audiences on the PBS television series *Dance in America*. The show, began in 1976, later became part of the PBS series *Great Performances*. He received two Primetime Emmy Awards for *Dance in America* and two awards for Directorial Achievement from the Directors Guild of America for *Great Performances*. He began his career at WCAU (AM) in Philadelphia in 1953. Within a year he was promoted to Director and worked on educational and children's programs. From 1967 to 1975 Brockway produced *Camera 3*, a Sunday morning program on CBS that he called "a walk through the marketplace of ideas." In 1980 he was named Executive Producer of Arts Programming for the newly formed CBS Cable cultural channel. Later he produced independent projects for television, including *The Romantic Era* and was the Coordinating Producer for the 1993 film version of *George Balanchine's The Nutcracker*. (NYT 5-13-13)

DR. JOYCE BROTHERS, 85, (5-13-13) psychologist. Dr. Brothers tended the psyche of American listeners and readers from the 1950s on. She was host of her own nationally syndicated television shows – *The Dr. Joyce Brothers Show*, *Ask Dr. Brothers*, *Consult Dr. Brothers* and *Living Easy With Dr. Joyce Brothers*. Dr. Brothers also had a call-in radio show, wrote a syndicated column appearing in about 350 daily newspapers, lectured, wrote books and was a frequent guest on talk and game shows. In the late 1940s and early 1950s she was teaching psychology at Hunter College in New York City when she quit to stay at home

with her baby daughter. In order to supplement the earnings of her husband, who was in medical residency, she appeared on quiz shows. Dr. Brothers began with *The \$64,000 Question* and eventually won the top prize. She repeated the feat on a spinoff show, *The \$64,000 Challenge*. She prepared for the shows as if she were writing a doctoral dissertation. (HC 5-14-13 + NYT 5-14-13)

DEANNA DURBIN, 91, (about 4-20-13) actress. Durbin's singing and smile made her one of Hollywood's best paid actresses during its Golden Age. She made her first feature film, *Three Smart Girls*, when she was 14. Some of her other film credits included *Every Sunday* (1936) with Judy Garland, *One Hundred Men and a Girl* (1937), *Can't Help Singing* (1944) and *Lady on a Train* (1945). Durbin was hired by Universal Studio and her strong screen presence saved the firm from bankruptcy. In 1938 she received an honorary Academy Award for her "significant contribution in bringing to the screen the spirit and personification of youth." Durbin performed on *The Eddie Cantor Show* (CBS 1935-1939). In 1949, at age 25, she retired from films and moved to the countryside of France to live in seclusion. Born Edna Mae Durbin in Canada, she was discovered by a talent scout who heard her singing at a school recital. (The Washington Post 5-04-13)

ANNETTE FUNICELLO, 70, (4-8-13) actress. Funicello was a "Mouseketeer" on Walt Disney's television show *The Mickey Mouse Club* (ABC 1955 to 1959). After the children's program ended she continued under contract to Disney and appeared in movies including *Johnny Tremain*, *The Shaggy Dog*, *The Horsemasters*, *Babes in Toyland* and others. Other film credits in-

cluded starring with Frankie Avalon in a series of “Beach Party” movies—*Beach Party* (1963), *Muscle Beach Party* (1964), *Bikini Beach* (1964), *Beach Bucket Bingo* (1965) and *How to Stuff a Wild Bikini* (1965). Some of Funicello’s other TV credits included *The Danny Thomas Show* (ABC 1959), *The Music Shop* (NBC 1959) and *Easy Does It...Starring Frankie Avalon* (CBS 1976) She also recorded 15 albums and singles such as *Tall Paul* and *Pineapple Princess*. In 1993 Funicello received her star on the Hollywood Walk of Fame. (HC 4-8-13 + The Washington Post 4-9-13 + www.cnn.com 4-8-13)

GEORGE HART, WINJMX (ex W3AMR), 99, (3-24-13) amateur radio executive. Hart was the chief developer of the National Traffic System (NTS). He described it in his article, “New National Traffic Plan: ARRL Maps New Traffic Organization for All Amateurs,” published in the September 1949 issue of *QST*. He began his career with the American Radio Relay League (ARRL) in 1938 as the second operator at the W1AW Maxim Memorial Station. Hart became Acting Communications Manager in 1942. Over the years Hart wrote over 800 articles for *QST* including two monthly columns “Operating News” and “Amateur Radio Public Service.” During WWII he served in the U.S. Army Air Force. Upon discharge he returned to the League as Communications Assistant. Hart was later named National Emergency Coordinator and served as Communications Manager from 1967 until his retirement in 1978. The ARRL Board of Directors created the George Hart Distinguished Service Award in 2009. (HC 4-16-13 + www.arrl.org)

CLAUDE KING, 90, (3-7-13) vocalist. King, a country singer and songwriter, was best known for the 1962 hit *Wolverton Mountain*. He wrote the song with Merle Kilgore. Some of King’s other hits included *Sheepskin Valley*, *Building a Bridge*, *Hey Lucille!* *Big River*, *Big Man* and *All for the Love of a Girl*. He was one of the original members of *Louisiana Hayride* which broadcast over KWKH (AM) in Shreveport, La. The program originated in the

Shreveport Municipal Auditorium and at one point it was broadcast nationwide and heard overseas on the Armed Forces Radio. The program was in its heyday from 1948 to 1960 and offered a variety of music genres—hillbilly, western swing, jazz, blues and gospel. King also appeared in a number of films. He served in the U.S. Navy in the Pacific Theatre during WWII. (www.latimes.com 3-8-13)

STEFAN KUDELSKI, 83, (2-2-13) audio engineer. Kudelski was the inventor of the first professional-quality portable tape recorder. He was a student at a Swiss university in 1951 when he patented his first portable recording machine, the Nagra I. Seven years later Kudelski introduced the Nagra III, a high-quality tape recorder that could synchronize sound with the frames on a reel of film. The Polish-born inventor received Academy Awards for his technical contributions to filmmaking in 1965, 1977, 1978 and 1990 and Emmy Awards in 1984 and 1986. In 1951 Kudelski founded the Kudelski Group, a Swiss electronics engineering firm, and served as its Chief Executive and Chairman until 1991. By 1960 their recording equipment was the standard in radio, television and film industries. Chris Newman, an Academy award-winning sound engineer, said, “There was virtually no film made from 1961 until the early ’90s that did not use the Nagra.” (NYT 2-1-13)

MARSHALL LYTLE, 79, (5-25-13) bass player. Lytle was an original bass player for “Bill Haley & the Saddlemen,” then a country-and-western band, in 1951. Michael Jordan Rush, who published Lytle’s memoir, said, “He’s known as the father of rock bass by some people.” The Saddlemen experimented with rhythm-and-blues and success followed so the name was changed to Haley’s Comets. They recorded such hits as *Shake Rattle and Roll* (1953), *Crazy, Man, Crazy* (1953) and *(Were Gonna) Rock Around the Clock* (1954). In 1955, with saxophonist Joey Ambrose and drummer Dick Richards, he left the Comets over a money dispute with Haley. They formed a band called the

Jodimars (the first letters of their names) and worked in Las Vegas lounges during the late 1950s. Lytle later went into real estate but returned to music in 1987, playing in a Comets reunion until weeks before his death. Lytle and other members of the Comets were inducted into the Rock and Roll Hall of Fame in 2012. (The Washington Post 5-31-13)

PAUL RAYMON, 85, (10-26-12) executive. Raymon was Chairman and Chief Executive of WAGA (TV) in Atlanta. He joined the station, owned by Storer Communications, in 1955 as Sports Director and four years later moved into sales. Within a year he was named Local Sales Manager and served as Storer's Southern Representative for TV Sales. In 1964 he became station manager and in 1969 he was appointed a Storer Vice President and then President of the firm's cable division. A few years later he returned to Atlanta as Vice President and General Manager of WAGA. Raymon retired in 1988, one year after the station was sold to Gillett Communications. He won Emmy and Peabody Awards in 1997 and was elected to the Georgia Broadcaster's Hall of Fame. He began his career when he was 15 years old at an Alabama radio station as a news announcer. Raymon taught media studies at a state university and operated the Raymon Media Group, an independent media consulting and programming firm. He served as Chairman of the Atlanta Urban League and on the board of the Anti-Defamation League. (www.atlantajournalconstitution.com 10-31-12)

BOBBY ROGERS, 73, (3-3-13) vocalist and song writer. Rogers, a tenor, was a founding member of the Miracles beginning in the mid-1950s which became one of Motown's most important ensembles. Some of their hit songs included *Shop Around*, *You've Really Got a Hold On Me*, *Mickey's Monkey* and *Going to a Go-Go*. In 1960 they had their first hit, *Shop Around*, which sold a million records. In 1967 they became "Smokey Robinson and the Miracles" and scored hits with *I Second That Emotion* and *Tears of a Clown*. As a teenager, Rogers sang with Robinson and Pete Moore all of

whom became members of the Miracles. In 1955 the group expanded to include five members and were known as the Five Chimes. They later were known as the Matadors. Robinson was elected to the Rock and Roll Hall of Fame in 1987. Fanes objected because it didn't include the Miracles. The oversight was corrected in 2012 when Rogers, Pete Moore, Claudette Robinson, Ronnie White and the guitarist Marv Tarplin were inducted together. (www.nytimes.com 3-4-13)

BILL ROSSI, 79, (1-9-13) radio personality. Rossi, a veteran reporter and anchor, was heard on Boston radio stations—WRKO (AM), WZOU (FM) and WXKS (FM), better known as KISS 108—from the mid-fifties to the late nineties. He began his career in New Bedford, MA at both WNBH (AM) and WBSM (AM). Next, he joined WPRO (AM) in Providence, RI and then become the morning newscaster at WRKO (AM) in Boston around 1970. Rossi later joined KISS 108 where he was News Director and anchor for both Sunny Joe White's *Great Awakening* and Matt Siegel's *Matty in the Morning*. His wife said, "His opinionated approach and dry wit made him a perfect foil and straight man for the morning-drive stars." Rossi joined WZOU as News Director in the early 1990s before going to WGIR (AM) in Manchester, NH. He was a member of the Screen Actors Guild and occasionally performed in films. Rossi retired from radio in 1998. He served in the U.S. Army during the Korean War. (Boston Globe 2-27-13 + Lowell Sun 1-13-13)

ED SHAUGHNESSY, 84, (5-24-13) drummer. Shaughnessy was the drummer in Doc Severinsen's band on *The Tonight Show* on NBC Television from 1963 until 1992. Severinsen described Shaughnessy as "the superb engine that drove our band for thirty years." During the 1950s he was a member of CBS studio orchestras and worked on the Steve Allen and Garry Moore shows. Shaughnessy performed in New York City during the 1940s and worked with such performers as Billie Holiday, George Shearing and Charlie

Ventura. He remained in the City during the 1950s and did studio work, recording and night club engagements. Shaughnessy also worked with such legends as Charlie Mingus, Duke Ellington, Elliot Lawrence and Johnny Richards. He gave hundreds of drumming clinics around the country and was a member of the Percussive Arts Society Hall of Fame. (The Washington Post 5-29-13)

GEORGE BEVERLY SHEA, 104, (4-16-13) gospel vocalist. Shea was a longtime associate of Rev. Billy Graham and appeared before an estimated 200 million people at Graham's revival meetings throughout the world. He also took part on *The Hour of Decision*, Rev. Graham's weekly radio broadcasts, which began in 1950 and continues to this day. Shea recorded more than 70 albums, including *In Times Like These* (1962), *Every Time I Feed the Spirit* (1972) and *The Old Rugged Cross* (1978). In 1966 he won a Grammy Award for best gospel or other religious recording for his album *Southland Favorites* with the Anita Kerr singers. Shea, a Canadian, began his career singing in his father's church. During the depression of 1929 he dropped out of college to help support his family and worked as a clerk in a New York City insurance company. From 1938 to 1944, Shea was an announcer and staff soloist at WMBI (AM) in Chicago. While there he met Graham who asked him to help with his program, *Songs in the Night*, heard on WCFL (AM) in Chicago. Shea later became host of *Club Time*, a gospel radio show broadcast on ABC Radio from the mid-1940s to the early 1950s. He was the recipient of many honors including induction into the Religious Broadcasting Hall of Fame (1996) and a Lifetime Achievement Award from the Recording Academy (2011). (NYT 4-18-13 + www.georgebeverlysheamemorial.org)

RISE STEVENS, 99, (3-20-13) mezzo-soprano. Stevens brought opera to millions of Americans through her 23-year career at the Metropolitan Opera, radio, television and films. Born Rise Gus Steenberg, her most celebrated roles were Delilah in

Camille Saint-Saens's *Samson and Delilah* and Octavian in Richard Strauss's *Der Rosenkavalier* and her signature work, *Carmen*. Some of Stevens' radio credits: *The Voice of Firestone* (NBC 1940s), *The Rise Stevens Show* (NBC 1943 and *The Railroad Hour* (ABC 1948-1949, NBC 1949-1954). A few of her film appearances: *The Chocolate Soldier* (1941) with Nelson Eddy and *Going My Way* (1944) co-starring Bing Crosby. After graduation from high school Stevens sang with the New York Opera Comique and soon rose from the chorus to solo parts. She debuted with the Met as Octavian in a Philadelphia performance in 1938. One of Stevens' retirement activities was directing the Met's National Council of Auditions. Her career was recognized by induction into the American Classical Hall of Fame in 2008 and National Endowment for the Arts Opera Honors in 2011. (NYT 3-22-13 + The Washington Post 3-22-13)

FRAN WARREN, 87, (3-4-13) vocalist and actress. Warren was the featured vocalist with bands led by Randy Brooks, Art Mooney, Billy Eckstine, Charlie Barnet and Claude Thornhill. Some of her hit records included the Tony Martin duet *I Said My Pajamas (and Put On My Pray'rs)*, *Dearie* with Lisa Kirk and *It's Anybody's Heart*. In 1947 her recording of *A Sunday Kind of Love* with the Claude Thornhill Band put her on the American charts for the first time. The song became her signature number. Warren also starred on Broadway in *The Pajama Game*, *Guys and Dolls* and in the title role of *Mame*. Warren made frequent television appearances on talk shows hosted by Johnny Carson, Mike Douglas, Merv Griffin and Steve Allen. She had several film roles including *Abbott and Costello Meet Captain Kidd* (1952). Born Frances Wolfe, she began singing while still in her teens, performing at local clubs and dancing in the chorus line at the Roxy Theater. (www.billboard.com 3-20-13 + www.telegraph.co.uk 3-25-13)

ESTHER WILLIAMS, 91, (6-6-13) swimmer and actress. Williams was a championship swimmer who became a famous movie star during the 1940s and

1950s. When she was 19 she was hired by Metro-Goldwin-Mayer in 1941 to compete against Sonja Henie, an Olympic gold medalist in figure skating, who was working for 20th Century Fox. Williams made her star debut in *Bathing Beauty* (1944). Other highlights of her film work: *On An Island With You* (1948), *Neptune's Daughter* (1949) starring Ricardo Montalban, *Pagan Love Song* (1950) and *Million Dollar Mermaid* (1952.) Her last film for MGM was *Jupiter's Darling* (1955) with Howard Keel. Williams grew up around local swimming pools and surfing and became a member of the Los Angeles Athletic Club swimming team when she was 15. In 1940 Williams was a member of the US Olympic team heading for Tokyo when the Second World War cancelled the Games and her dreams of international fame. When her movie career ended Williams established "Esther Williams Swimming Pools" and "The Esther Williams Collection of Swimwear Brands." (The Washington Post 6-7-13 + www.guardian.co.uk 6-6-13)

JOHN L. WINDLE, PE, 81, (3-23-13). Windle specialized in broadcast and transmission towers. Although he had a fear of heights he designed some of the tallest towers in the world, reaching heights of 2,000 feet. In comparison, the Eiffel Tower is 985 feet tall. Windle was Vice President and Chief Engineer for Stainless Inc. of North Wales, PA. He presented many publica-

tions to the National Association of Broadcasters and contributed writings to "Structural Standards for Steel Towers and Antenna Supporting Structures." Windle also wrote a chapter of *Structural Condition Assessment* by R.T. Ratay, P.E. After retirement he continued to work as an independent consultant until December 2012. Windle was very active in many local organizations frequently serving in leadership positions. (Daily Local News 3-25-13)

Information for this column was obtained from *The Boston Globe*, *The Complete Directory of Prime Time Network and Cable TV Shows 194-Present* (9th edition), *Daily Local News*, *The Encyclopedia of Jazz*, *The Hartford Courant*, *Lowell Sun*, *On the Air: The Encyclopedia of Old-Time Radio*, *The Washington Post*, www.arrl.org, www.atlantajournalconstitution.com, www.billboard.com, www.cnn.com, www.georgebeverlysheamemorial.org, www.guardian.co.uk, www.imdb.com, www.latimes.com, www.nytimes.com, www.telegraph.co.uk, and www.wikipedia.org.

The writer wishes to express his appreciation to Gene Garrison, K4KSU, Ted Hannah, K3CL and Dr. A. David Wunsch for additional source material. 

AT THE MUSEUM, cont. from page 11

ham radio incorporating separate service benches. Upon its completion, John assumed the management of this installation and maintenance of the test equipment.

At this writing, the AWA plans to be present in the Curtis theater at the George Eastman House in Rochester, NY on Saturday, September 21st, when a radio play adaptation of "The Thirty-Nine Steps" will be performed. We have already provided microphones for the actors and will also provide a display of 1940s artifacts and AWA promotional material highlighting the recent open-

ing of the new museum. The AWA will also take part in the question and answer period following the production. We are indebted to Karen Tuccio and her production company for providing this opportunity to expand our exposure to the general public.

All requirements have been met with the underwriters regarding the donation of a 2004 Suburban to the AWA. This Suburban will be an excellent vehicle for collecting artifacts donated to the museum. Eight of the Tuesday volunteers have been designated as insured drivers. 

THE VACUUM TUBE

EDITED BY **LUDWELL A. SIBLEY**, 102 MCDONOUGH RD., GOLD HILL, OR 97525-9626

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Electric Lamp History CD – Tube Regeneration

A Review of *History of the Electric Lamp*, a book in CD format By Fin Stewart, 2013, ISBN 978-0-646-23418-2, 594 pp., 10-meg searchable PDF file, indexed.

The history and collecting of electric lamps is a somewhat arcane topic. There have been great collections over the years, notably that of the late Dr. Hugh Hicks of Baltimore and Floyd Lyons of San Francisco. Most of the big early collections (pre-1930, say) have gone to repositories like the Ford Museum or the British Science Museum, or the private archives of the major manufacturers (NV Philips, for example).

There are masses of historical material on the Web today, of course, provided one isn't too picky about permanence of the material. However, printed history has been available only in dribs and drabs. Old-time books on electricity are helpful but not comprehensive. Ads in contemporary publications like *Electrical World* are insightful but, again, incomplete.

In any event, long-time tube-and-bulb collector Fin Stewart has now given us a coherent history of the inventions, corporate struggles, and technology in the electric-lamp industry. Stewart has been a prominent author in the vacuum tube field, producing two editions of a lengthy illustrated history of Philips tubes, writing the "Valve Box" column for the Historic Radio Society of Australia, and contributing at least five articles to the *OTB/Journal and Review*.

Stewart has also been collecting lamps for decades and researching their history. The result is a worldwide history, ranging from the umpteenth predecessors to Thomas Edison to the modern trend to compact-fluorescent and LED lamps. Detailed are the original carbon bulbs, the metal-filament types (osmium, tantalum, Nernst "glower,"

sintered-tungsten, and ductile-tungsten). He covers lamps with gas filling as well as the structural evolution of the lamp (bases, bulbs, internal features). Also described are the various gas/vapor lamps (neon, argon, carbon dioxide, mercury, and sodium).

Stewart discusses the early struggles over patent rights and the various monopolies and cartels among manufacturers in Europe and the U. S. He includes Eastern Europe, Australasia, and Japan in his narrative.

The book is heavily illustrated from Stewart's massive collection and other sources. Most of the bulb pictures are—given the publication medium—in color.

Stewart provides appendices that add dimensions to the main text. One describes the first comprehensive bulb collection, that of William J. Hammer of the Edison Laboratory, displayed at the St. Louis Exposition in 1904. Another lists "all known" lamp brands internationally through 2002. These include numerous names that are perhaps better known as applying to tubes—Condor (Holland), Ediswan (Britain/Australia), Fotos (France), Ostar (Germany) and so on. A third lists the bewildering variety of "standard" base designs that have appeared in the industry worldwide.

In addition to the "brands" list, another appendix gives the known companies and factory locations. Finally, there is a photographic catalog of lamps collected by the author over a recent 12-year period. This should be heartening to prospective lamp collectors: samples are rare in the radio-collector or general antiques markets, but a remarkable number of treasures appear on eBay.

The CD can be ordered from the author: Fin Stewart, 38 Primrose St., Wingham, NSW 2429, Australia, for \$Aust. 57 including air postage. Payment by PayPal, to ferrowatte38@bigpond.com, is preferred,

but a personal or bank check is acceptable.

An Adventure in Tube Rejuvenation

The old-time wisdom on rejuvenating tubes with thoriated filaments (e. g., UX-201As) was that a falloff in emission could be corrected by overdriving the filament with triple voltage or so for about 30 seconds, then letting the tube run at normal voltage for a time ranging from a couple of hours to perhaps overnight. This wisdom apparently first appeared in a circular issued by the (then) National Bureau of Standards about the time that thoriated receiving tubes were introduced, ca. 1925. Filament rejuvenators (transformers that applied the necessary overvoltage) were widely available as long as 201As were popular.

No similar claim applied to the earlier pure-tungsten types (UV-201A, UX-200, and so on). Nor did it pertain to tubes with oxide-coated filaments (WD-11, etc.) In theory, it did not apply to tubes with indirectly heated cathodes, although later experience indicates that it may in fact work.

At the same time, a lot of UX-201As with “open” filaments turned out to have opened-up from recrystallization of the “solder” (pure tin, actually) in the pins. The writer once had a lot of fun with half a grocery bag of “open” and “weak” 201As. Detailed statistics are unavailable (alas!), but a great many from the lot responded to detection of bad soldering by application of an oil-burner transformer (2 kV or so, self-limited to 23 mA) to the filament pins.

If the solder joint was bad, the joint would quietly conduct and there was no particular reaction. If the filament was truly open internally, however, a bright arc took place at the location of the break. To make this test, attach the leads, stand well clear, and plug the transformer in. In the absence of an oil-burner unit, a small neon-sign transformer may do as well. Also, the piezoelectric flame-starter in a barbecue lighter can provide the necessary high voltage, but the arc in the tube is much weaker and the test must be made with the lights out.

The high-voltage test, by the way, is only a diagnostic measure. No corrective effect

is implied. There has been a suggestion, not yet tried, that an open filament might be re-welded by connecting it to a capacitor of a few thousand microfarads, charged to perhaps 12 volts, and tapping the tube until the open ends touch. Trouble is, the 10 has filament tensioning springs that would likely hold the broken ends apart.

An opportunity to try these old tricks came up recently with the presentation of sixteen Type 10s to a tube-collector group with which the writer is connected. Sixteen 10s in one group—a jaw-dropping set! Now the 10 is a thoriated-filament type, so what works on 201As should apply to it. (The similar Type 50 is a coated-filament design to which rejuvenation nominally does not apply.)

The tubes looked healthy, with only light discoloration of the bulbs and bright getters. However, as it turned out, someone had been saving his duds. The problem was to identify and separate the hopelessly open ones, the tubes where the open condition could be fixed, the ones with good transconductance, and the weak units that could be rejuvenated.

The ultimate results of the project were as follows:

Unrepairably open	8
Repairably open	0
Filament OK, no emission	3
Weak, now OK	2
Weak, still weak	2
Weak, now weaker	1
OK, still OK	2

It was a surprise to find no filament via the oil-burner test that could be corrected by resoldering. This differed widely from experience with the 201As. In any event, the high-voltage test saved ample time over a “speculative” resoldering.

The rejuvenation routine saved two tubes—not a big percentage, but these are valuable parts, so the effort was justified. Usually only one pass of rejuvenation is needed, but a re-cycle is always possible. 📺

RADIO RAMBLINGS

BY **JIM COOK, WO0XX**, 21903 W. 57TH TERRACE, SHAWNEE, KS, 66226—PLEASE INCLUDE SASE FOR REPLY.
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The Topeka High School Radio Club

I attended Topeka High School from the fall of 1960 until my graduation in the spring of 1964. It is a beautiful historic building located just a few blocks west of the state capitol. This was the only high school in Topeka for many years, and it offered a broad curriculum to the 1,800 students who attended, including everything from college preparatory classes to vocational education. The vocational courses included auto mechanics, printing, and radio.

The radio class was taught by Mr. Charles Shroyer. It was intended to prepare students for a career as a radio or television technician. Mr. Shroyer was a good teacher and well-liked by most of his students. The students could bring in their own radios to repair as part of the class, and time was allowed for some fun projects such as constructing a Tesla coil. The curriculum was heavily focused on vacuum tube radios, emphasizing “All American Five” AC/DC radios. I doubt if the material taught in the class had changed in many years, and it was becoming dated by the 1960s.

In the corner of the classroom was an amateur radio club station with the call let-



The Topeka High School Radio Club was tucked into a corner of radio instructor Shroyer's classroom.



The K0IRF QSL card as printed in the high school vocational shop.

ters K0IRF. Although I was not taking Mr. Shroyer's radio class, I joined this radio club in my junior year. The station consisted of a Hallicrafters S-38D receiver and a crude homebrew transmitter with an input power of approximately 30 watts. The power supply, a 6AG7 crystal oscillator, and the 6DQ5 final amplifier were separate units. The antenna was a quarter-wave-length wire strung above the second floor roof of the building. We only had one crystal for the 40-meter novice band.

I was the only member of the club with an amateur radio license, and Mr. Shroyer urged me to get on the air and stir up some interest, hoping that some of his radio students would get their licenses and operate the station. Even though we could only operate the station for one hour before classes on school days, I was able to complete several dozen QSOs and received some QSL cards to display in the classroom.

Operating this station attracted several new members to the radio club, and I thought we had an opportunity to help other students get their licenses. I also hoped that we could improve the station equipment. Everyone seemed pleased with that idea, and I was elected president of the radio club during my senior year. Being president of

the club looked good in the student yearbook, but I was given that honor primarily because I was the only member with an amateur radio license.

Originally, the club transmitter had a power supply that did not provide high enough plate voltage to obtain full output from the final amplifier. I rebuilt the supply using a bridge rectifier configuration with one 5U4G and two 6AX4GTs. *It provided* two output voltages; approximately 500 volts for the final amplifier and 250 volts for the crystal oscillator. This increased our input power to approximately 30 watts.

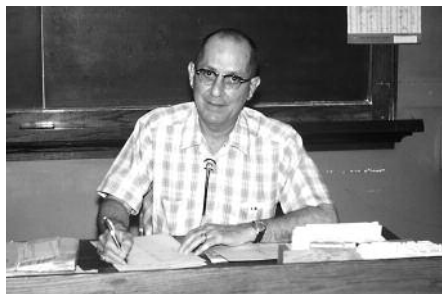
However the transmitter was poorly designed. The antenna was coupled directly to the final amplifier with no means to reject harmonics that might be present. We really needed a better, more versatile transmitter that would appeal to operators with both Novice and General class licenses.

I planned to build a new transmitter that would use the existing power supply and 6AG7 oscillator circuit. It was to be a CW transmitter with a power input in the 75-100 watt range and capable of using either crystal or VFO control.

Initial operation would be on 40 meters, but we could upgrade the transmitter later for operation on other bands. We found a nice chassis and panel for the new transmitter, along with a vernier dial for the VFO, but we were missing several parts that could not be scrounged from the discarded radio and television receivers we had available for parts.

I agreed to donate several parts, including a pair of 1625 tubes that I planned to connect in parallel for the final amplifier. We chose 1625s because they were being sold by Burstein-Applebee in Kansas City at that time for 20¢ each.

But we still needed a high voltage tuning capacitor for the final amplifier, a final amplifier tank coil, a small variable capacitor for the VFO, and some other small parts that would need to be purchased. I prepared a schematic diagram, based upon the Knight 50-watt transmitter that was being sold at that time. Several members of the club volunteered to help me build the new transmitter.



Charles Shroyer, vocational radio instructor and Radio Club Adviser.

Unfortunately, we had no money to buy the items we were missing. And when our efforts switched from operating the station to building a new transmitter, interest in the radio club decreased. Even the members who had volunteered to help me with the project lost interest, and no one seemed to want to learn the code and theory skills they needed to get a Novice license.

I decided to suspend my efforts to build a new transmitter and concentrated on helping the club get a better receiver. For my home station, I was using a Lafayette KT-200 receiver that I had built from a kit the previous year. It was better than the S-38D, but its performance was disappointing. I was able to purchase a used S-85 receiver that had better performance for my home station and donated the KT-200 to the radio club.

By this time, I was approaching the end of my senior year, and Mr. Shroyer became impatient with me because the new transmitter was not finished. But with no interest from the club members and only one hour on school days to work on it, progress was difficult. Because there was no one licensed to operate the station after I graduated, the project hardly seemed worthwhile.

In retrospect, I should have asked my other amateur radio friends for help in obtaining a better transmitter. I was also a member of the Kaw Valley Radio Club, and someone in that organization might have been willing to donate a working Novice transmitter to our club. But I was occupied

(continued on page 29)



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The Chubbucks of Utica, New York

Part Two: A.S. & H.E. Chubbuck

After part one of this article was published in the Spring, 2013 *Journal*, I was able to confirm that at least one meeting between Samuel Chubbuck and Samuel F.B. Morse did indeed take place in Utica. It also serves as another confirmation of how early Chubbuck was established as a manufacturer of telegraph instruments for the New York, Albany, Buffalo Magnetic Telegraph Company. In a letter to Alfred Vail dated March 17, 1846, Morse writes:

I saw in Utica an excellent mechanican who is making good instruments for Mr. Faxon for the western stations. His name is Chubbuck, the same who wrote to me some time ago respecting leave to lecture and to make instruments. He is an ingenious, modest,[illegible] man. I think he might be of service if we could have him near us.

Samuel Chubbuck's eldest son, Arinaldo S. Chubbuck, was born in 1836. He developed the same interests and talents as his father. When he was 16 he built a small brass steam engine and displayed it at an annual mechanic's fair held in Utica. By 1855, Arinaldo was listed as being a machinist in his father's shop. In 1859, both Samuel and Arinaldo are listed together as Telegraph Instrument Manufacturers in Utica Directories. By the late 1850s, Chubbuck's operation expanded and was relo-

cated to different addresses on Genesee Street before settling at 34 Genesee Street in 1857. A few years later in 1864, they moved to even larger facilities at 28 Hotel Street.

Early in their operation, the Chubbucks claimed to have introduced the first commercial telegraph sounder. The sounder became a standard receiving instrument in all U.S. offices. Their claim probably needs to be clarified. Telegraphers were the ones who first started to read Morse by listening to the sound of the telegraph register's lever

moving between its stops as it imprinted dots and dashes on a moving strip of paper. I believe telegraph engineer Franklin Pope best described the actual origin of the sounder.

Pope felt that the idea of a sounder probably came from some ingenious telegrapher who may have stripped down a register leaving just its electromagnet and lever in operation. But it appears that the first commercially-produced, small, stand-alone sounder was designed by A.S. Chubbuck. Pope stated in 1872:

The little 'pony' sounder, of which not less than six thousand are clicking within the limits of the United States as these words are written, was invented by A. S. Chubbuck, of Utica, N.Y., and not a few operators still think that no one else can make them to sound quite as well.



Arinaldo S. Chubbuck



H. Eugene Chubbuck

The Chubbuck firm expanded its manufacturing beyond the needs of the New York, Albany, Buffalo Magnetic Telegraph Company and advertised in the trade journals. They manufactured instruments for railroads and other telegraph companies. Some A.S. Chubbuck instruments have been found with New York Central Railroad markings. By the 1850s, the main wires of the New York, Albany, Buffalo Magnetic telegraph Company followed the route of the New York Central Railroad across New York State.

James D. Reid stated that the “Canadian lines were supplied almost wholly from his (Samuel Chubbuck’s) shop.” They also supplied instruments to Western Union prior to 1866 and apparently to the short-lived but expansive United States Telegraph Company. Several keys that are identical to Chubbuck-marked keys have been found with just U.S. Telegraph Co. markings. Western Union absorbed the U.S. Telegraph Co. in 1866. It should be noted that historian, James D. Reid was once the superintendent and a director of the New York, Albany, Buffalo Magnetic Telegraph Company and lived in Utica during the period he worked for the company.

In 1867, Arinaldo took over the telegraph business and his father stepped aside, setting up a small business for himself as an Optical Instrument Maker with a “Variety Store” at the same 28 Hotel St address as the telegraph factory. Samuel’s store offered things like opera glasses, violins, and brass and German-silver sheet metal and he also served as a repairer of all kinds of instruments. He offered his customers “hot breakfast rolls every morning.” Samuel W. Chubbuck passed away on January 28, 1875 at age of 75. It should be mentioned that



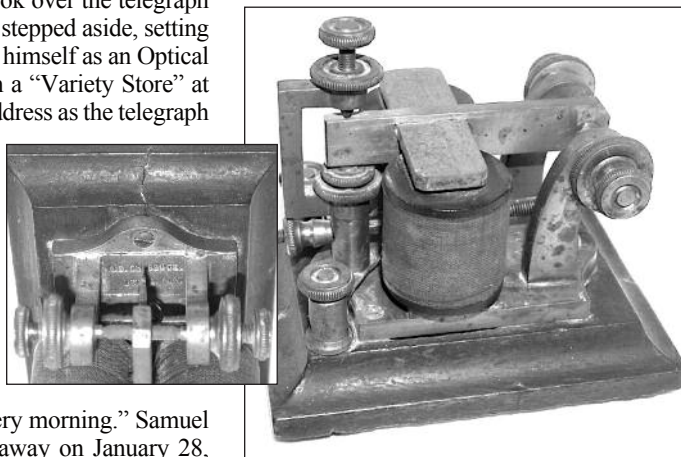
Insulator bracket designed by H. Eugene Chubbuck

he was a noted collector of musical instruments, stamps and especially coins and tokens.

Chubbuck’s son, Arinaldo, continued to operate the telegraph business until he passed away on May 28, 1878 at age 42. Apparently, Arinaldo was sick for several years prior to his death but continued to

work until the end. He took pleasure in just being around his workbench and family. He also built models for inventions by fellow mechanics in central New York State. Most of the Chubbuck instruments found today have A.S. Chubbuck markings. Neither Samuel nor Arinaldo Chubbuck applied for any patents. They felt that the public should benefit from their inventions. Unfortunately, without the patents, there was no formal record of the major contributions they made to the telegraph industry.

After Arinaldo’s passing, his widow and his son, H. Eugene, (who had trained under his father) moved the factory to 35 Seneca Street and continued to run the operation until it closed in 1885. Later, H. Eugene Chubbuck moved to various western and midwestern locations and pursued a career in the electrical industry. He worked as an



Chubbuck Sounder with close-up of markings.

engineer, manager and executive with various electrical utility and street-car line companies including the General Electric Company. Unlike his father and grandfather, Eugene did file for two patents. One, in 1890, was for a wall bracket that accepted a variety of threaded insulators.

SOURCES:

Oneida Morning Herald, Utica, NY, February 11, 1853.

Journal of the Telegraph, August 1, 1868
Relays, Keys, "Registers and Sounders,"
By Franklin L. Pope

The Telegrapher, July 27, 1872

Utica Morning Herald, Utica, NY, May 30, 1878.

The Telegraph in America, by James D. Reid, 1879, Derby Brothers.

Memorial History of Utica, N.Y., M.M. Bagg. M.D., D. Mason & Co., 1892.

Utica Saturday Globe, Utica, NY, December 25, 1909

Public Service, Vol. VIII, No 2, Chicago, February 1910.

Electrical World, February 24, 1910

Lightning Man, The Accursed Life of Samuel F.B. Morse, by Kenneth Silverman, Knopf, 2003.

U.S. Patent, 436,120, September 9, 1890, H.E. Chubbuck.

Utica City Directories, 1842-1900.

Harold Wallace, National Museum of American History.

The Papers of Samuel F.B. Morse, Library of Congress

The Oneida County Historical Society



Part of the Chubbuck family plot at Forest Hills Cemetery, Utica, NY

RADIO RAMBLINGS, *cont. from page 26*

with taking college entrance exams and getting ready to pursue an electrical engineering degree at the University of Kansas.

I returned to Topeka High School for a visit a few years later, and learned that Mr. Shroyer had retired shortly after I graduated. The vocational radio course had been discontinued, and the radio club ceased to exist. The classroom was being used for other purposes.

When I was moving to a new house recently, I ran across a blank QSL card from that club station, and it is pictured in this ar-

ticle. The background color is brown with a wood grain detail.

The cards were printed by the Topeka High School vocational printing shop and featured our Trojan school mascot. The print shop obviously found the "government zero" symbol to be challenging

These QSL cards are probably rare. We only sent out 20 or 30 of these while I was a member of the club. If you happen to have one of these, I would like to hear from you. If your card is from the early 1960s, the operator's name is probably Jim!

ANNUAL CONVENTION CANDIDS



Severin Dvorsky and Chris Fandt making the flea market rounds.



Irv Goodman, AF2K (left) and Rich Veuillequez, KC1FB manning the Rochester DX Association booth.



The Ladies Luncheon provides an opportunity for "radio widows" to chat and compare notes on the convention.



Jonathan Bouve (left) and Lauren Peckham research a rare tube at the Book Fair.



The Estes team ran the auction with the usual swiftness and efficiency.



(From left) Ted Catton, Bengt Svensson and Bill Ross chat after Bengt's presentation.



People from different countries had an opportunity to meet and chat at the banquet's international table.



Bill Ross (left) and Bengt Svensson (center) look over the wares at the Book Fair.



Ted Catton (left) and Anders Widell following Anders' presentation.



Mike Molnar (left) with Felicia and Jim Kreuzer.



A live band provided music for dancing at the Pizza Party.



Professor Franz Pichler (left) with Tom Perera.

SEMINAR 2013 SNAPSHOTS



Mikel Molnar delivering his presentation on the Neutrodyne and the Hazeltine Corporation.



Rochester DJ Paul Jason presents *Modern Radio*.



Bengt Svensson entertained his audience with pictures he has taken at conventions of years past.



From Mule to Man: the Development of Military Squad Radio was the subject of Roy Wildermuth's convention presentation.



Anders Widell took his audience on a pictorial tour of The Radiomuseum in Jnkoping, Sweden.



Part of Richard Brewster's presentation involved an explanation of the control of electron flow in a special demonstration vacuum tube.



Dan Bedford (right) chats with a member of his audience after his presentation *A Discussion of Radio Collecting in Australia*.



Tim Walker conducting his yearly *Review of Amateur Operations*.



Steve Auyer's presentation was a discussion of G.E.'s transistor portable radios.



Bruce Roloson updates members on progress at the museum at the AWA Member's Forum.

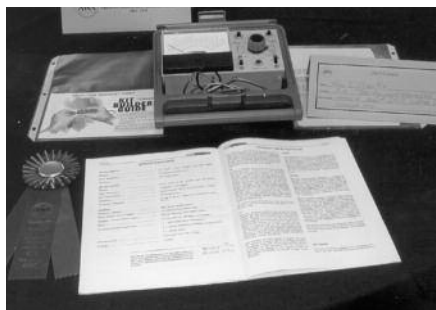


Mike Adams (seated) concludes his program *A Conversation With Eleanor de Forest* as Bart Lee prepares to give his presentation *Radio Archeology: Do it Now Before It's Too Late*.



The pre-1912 equipment show-and-tell session, moderated by Felicia Kreuzer and Lauren Peckham, always draws a crowd of interested onlookers.

SELECTED BLUE RIBBON WINNERS



Frank Feczko took first place in the Heathkit *Assembled Test Equipment* category (3A) with his IM-17 VOM.



Geoff Bourne's EC-1 Analog Computer won the blue ribbon in the Heathkit *Computer Systems* category (4A).



Top honors in the Heathkit *Other Products Assembled* category (3G) went to Robert Lozier's XR-1 Transistor set.



Dan Bedford's "In the Spirit of Atwater Kent" model breadboard tied for first in *New or Rebuilt* (Standard Category 24).



Philip Taylor tied for first in *New Or Rebuilt* (Standard Category 24) with his 2-tube sw with Hartley tuner.



In Standard Category 7 (*Passive Receivers*), Bob Dobush took first prize with his Clapp-Eastham loose coupler, Eico detector and radio license.

As always, this year's contest room contained more fascinating entries than we could possibly do justice to on these pages. However, here is a group of blue-ribbon winners that caught the photographer's eye as he toured the exhibits. Photos by Richard Ransley.



Tom Peterson's rare Model O-1 Scope won the blue ribbon in the Heathkit *The Anthony Years* category (2) as well as *Best in Show*.



Top honors in the Heathkit *Other Products Unassembled* category (3H) went to Joe Knight for his collection of unusual kits.



The blue ribbon in the Heathkit *Audio (Hi-Fi) Products Assembled* (3E) category went to Leonard Hunter for his rare AD-16 tape recorder.



The blue ribbon in the Heathkit *Audio (Hi-Fi) Products Unassembled* (3F) category went to Doc Murphy for his AT-1124 8 Track and amplifier kit.



Michel Chabot received a first prize in the *Open* category (25) for his Westinghouse Model 500 and 501M display. He also received the *People's Choice* award.



Top honor in the *Electronic Television* category (17B) went to David Kaiser for his Pilot 3-inch set with case.

AWA CONFERENCE AWARDS REPORT

The AWA Recognition Awards

These awards are traditionally presented during the annual banquet, given this year on the evening of Friday, August 23rd. Nominations for the first six awards listed below are solicited from the AWA membership at large and each winner is selected by a special committee charged with administering that particular honor.

The AWA Houck Award for Preservation is for a member who, through personal accomplishment, has acquired, and preserved by documenting, an outstanding collection of radio artifacts. Presented to Merrill Bancroft for his work on preserving the history of radio by his outstanding collection.

The AWA Houck Award for Documentation goes to an AWA member who has written original articles on radio development or history in the AWA Journal, AWA Review, or other publication. (This can include a book on a related subject.) Not awarded this year.

The Bruce Kelley-OTB Award is given to the member who publishes in *The AWA Journal* an article judged to be the most outstanding, original, historical presentation of the award year. For this year, articles in he July and October 2012 and the January and April 2013 issues were considered. Presented to Thomas J. Warnagiris, K3GSV for his articles "iPhones, Radios, and World War II" that appeared in the October 2012 and January 2013 issues.

The J. Albert Moore Award comes to us through the Antique Radio Club of America, which was merged into AWA several years ago. The award honors Mr. Moore's contributions to ARCA. As given by the AWA, it recognizes the *AWA Journal* article, or series of articles, deemed to be the most outstanding of those dealing with radio hardware (radio sets, radio systems or components) printed during the award year. The issues considered are the same as those considered for the Bruce Kelley-OTB Award.

Presented to Dan Merz for his article "*Powering Battery Radios*" in the January 2013 issue.

The Taylor Award, in memory of John Taylor, RCA TV Developer, is for preserving television history. Not awarded this year.

The Tyne Tube Award is presented, in remembrance of Gerald F.J. Tyne, for contributions to preserving or documenting the history of tube technology. Not awarded this year.

The AWA Director's Award was presented to Bruce D. Roloson for his years of dedication and contributions to AWA.

The AWA Deputy Director's Award was presented to Paul Beaty of Betacon for the construction of the new museum.

The AWA Electronic Communications Museum Service Award was presented in memory of Mike Csontos and his many years of serving AWA.

The AWA Electronic Communications Museum Special Service Award was presented to Chuck Schwark for his tireless dedication and contributions as Web Master for The Antique Wireless Association.

The AWA Electronic Communications Museum Curator's Award went to David Bart for his many years of dedicated service to AWA.

The Max Bodmer Award is for the creation of works that support future scholarship in the field of electronic communication history. Dr. Bodmer, a long time employee of Bell Laboratories, developed the Travelling Wave Tube used in the Telstar Satellite, the world's first television-capable communication satellite. He has endowed the Dr. Max Bodmer Library and Research Center at the Antique Wireless Association's Museum Complex. This year, the Bodmer Award goes to Bill Burns for dedication to the compilation and preservation of resources Supporting scholarship in the field of electronic communications history.

The AWA Museum Award was presented to Caroline and Sandy MacMillan for their years of dedicated service to AWA.

Winners of the AWA amateur radio events are as follows: 1929 Bruce Kelley

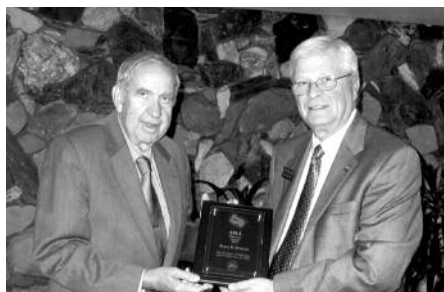
Memorial QSO Contest: Paul Kelley, N1BUG; Linc Cundall Memorial OT Contest, John Bogarth, N2BE; AM QSO Party, Larry Szendrei, NE1S; Rollins DX Contest, not awarded.



Tom Peterson presents the Curator Award to David Bart (center). Bruce Roloson is at right.



Bill Burns (right) receives the Dr. Max Bodmer award from David Bart.



Bruce Roloson (right) receives the Director's Award from Tom Peterson.



Merrill Bancroft (right) receives the Houck Award for Preservation from Tom Peterson.



During the awards ceremonies, Merrill Bancroft (left) presented James Millen's Stevens Institute of Technology diploma to Curator Emeritus Ed Gable.



Marc Ellis (left) presents Chuck Schwark's Special Service Award to him at his home.

2013 Old Equipment Contest Winners

Contest Theme: Heathkit

THEME CATEGORIES

Category 1:

Aviation Artifacts 1912-1945

No Entries

Category 2:

The Anthony Years 1945-1954

- 1st Tom Peterson
O-1 Oscilloscope
- 2nd Leonard Hunter
A3 and A4 Amplifiers
- 3rd David Kaiser
W4 Amplifier and P2 Preamp

Category 3:

The Daystrom/Schlumberger Years 1954-1979

Test Equipment

3A: Assembled

- 1st Frank Feczko
IM-17 VOM
- 2nd Crawford MacKeand
IT-18 Transistor Tester

3B Unassembled
No Entries

Amateur Radio Products

3C: Assembled

- 1st Geoffrey Bourne
*RX-1 Mohawk, Tx-1 Apache,
K1-1 Chippewa, SB-10*
- 2nd Lynn Bisha
SB-104 System
- 3rd Joe Long
HD-19, PM-1 and CA-1

3D Unassembled
No Entries

Audio (Hi-Fi) Products

3E: Assembled

- 1st Leonard Hunter
*AD-16 Reel to Reel Tape
Recorder*

3F: Unassembled

- 1st Doc Murphy
*AT-1124 8-Track and
Amplifier Kit*

Other Products

3G: Assembled

- 1st Robert Lozier
XR-1 Transistor Sets
- 2nd Joe Long
DF-1 Direction Finder Working
- 3rd Geoffrey Bourne
RC-1 Geiger Counter

3H: Unassembled

- 1st Joe Knight
Collection of Unusual Kits

Documentation

3I: No Entries

Category 4: Computer Systems

4A: Heathkit Computers (EC-1 to H 89)

- 1st Geoffrey Bourne
EC-1 Analog Computer

4B: Zenith and ZDS Computers
No Entries

Category 5:

Heathkit Technical Documentation

No Entries

Category 6: "GRIEFKITS"

- 1st Tim Walker
Oscilloscope from Scratch

STANDARD CATEGORIES

Category 7: Passive Receivers

- 1st Bob Dobush
*Clapp Eastham Loose Coupler
EICO Detector and Radio
License*
- 2nd Robert Bruce
Gamages Crystal Set

3rd Merrill Bancroft
Paragon Set

Category 8: 1920s Superheterodyne

1st Gary Alley
Stroboddyne Radio

Category 9: 1920s TRF Receivers

1st Stuart Mount
Western Electric 3A with Loop Antenna

2nd Robert Lozier
Quadraformer Glass Set

3rd. Merrill Bancroft
Atwater Kent 4066 in Box

Category 10:

1920s Regen and Reflex Receivers

1st Richard Brewster
Paragon RA-10, DA-2, 10-R set

2nd Merrill Bancroft
QT Light set

2nd Steve Wallace
Wireless Shop Set

3rd Gary Alley
Crosley Super Trirdyn Regular

Category 11:

Cathedrals and Tombstones

1st Robert Lozier
Atwater Kent 768Q Air Cell Radio

Category 12: Military Radio

12A: Pre WW II

1st David and Julia Bart
Lincoln's Telegraphers

2nd Tom Perera
Heliograph

12B: WW II (1941 - 1945)

1st Tom Burgess
SCR 504a Spycatcher

1st Bill Ross
Japanese One-Tube Transceiver Type 99 Model 6

2nd Tom Perera
Disassembled Enigma

2nd Jim Green
Mule Pack Set

3rd Roy Wildermuth
Collins TCS Radio System

12C: Post WW II (1946-1960)

1st Roy Wildermuth
BC 133J Jeep Radio

12D: Vietnam Era

1st Roy Wildermuth
Hughes PRC-104

12E: Misc

1st Tom Perera
Fialka Code Machine

2nd Roy Wildermuth
Harris PRC-138

Category 13: Portable Radios

1st Richard Brewster
Zenith Trans Oceanic Brown Leather

Category 14: Speakers

14A: Horn

1st Geoffrey Bourne
Town Crier Speaker

2nd Merrill Bancroft
Baldwin Claraphone

3rd Tom Burgess
Sea Horns Speakers

14B: Cone
No Entries

Category 15: Test Equipment

1st Tom Murray
Hickok Model 650

2nd Doc Murphy
Jackson Model 64

Category 16: Tubes

1st Joe Long
Case of VT-1 Tubes

Category 17: Television

17A: Mechanical

No Entries

17B: Electronic

1st David Kaiser
Pilot 3-inch Set in Case

Category 18: International Radio

18A: Pre 1945

No Entries

18B: Post 1945

No Entries

Category 19: Novelty Radio

19A: Tube

No Entries

19B: Transistor

1st Tim Walker

Crystal Set by Joe Strolin

2nd Donald Hudson

*Lip Radio***Category 20:****Spark Transmitters and Receivers**

1st Tom Burgess

*de Forest Syntonizer and Responder***Category 21:****Vacuum Tube Transmitters and Receivers**

A: Homebrew

1st Sam Dick

6L6 Push-Pull Transmitter

B: Commercial

1st Steve Wallace

Westinghouse Model TS Transmitter with MG Power Supply

1st Geoffrey Bourne

*James Millen Station***Category 22:****Restoration of Appearance**

1st Robert Lozier

Delco Model RA-3 and Rb-3 32 Volt Sets

2nd Bill Holly

*Radio Marine Corp. of America Type B Crystal Set***Category 23: Restoration of Operation**

1st Bill Zukowski

*VE 301 DYN Peoples Radio***Category 24: New or Rebuilt**

1st Dan Bedford

In the Spirit of Atwater Kent

1st Philip Taylor

2-Tube SW with Hartley Tuner

2nd Tom Burgess

Midget Radio

2nd Bill Holly

*Crystal Set***Category 25: Open**

1st Bob Dobush

Magnetic Balance

1st Michel Chabot

Westinghouse Model 500 and 501M Display

2nd Tom Perera

Early Motor with Geissler Tube

2nd Joe Knight

QSL Card display Wood Veneer

2nd Tom Burgess

Crosley Optical Illusion

3rd Merrill Bancroft KWKH Display

3rd Richard Modafieri

RF/IF Transformer Rebuild Display

Special Robert Macintyre

*My Radios of Yesteryear***EUNICE THOMPSON BEST OF SHOW AWARD**

Tom Peterson

*Heathkit O-1 Oscilloscope***RALPH O. WILLIAMS DISPLAY AWARD**

David and Julia Bart

*Lincoln's Telegraphers***PEOPLES CHOICE AWARD**

Tom Peterson

*Heathkit O-1 Oscilloscope***ELLE CRAFTSMAN AWARD**

Robert Lozier

*Quadraformer Radio Display***MATLACK TRANSMITTER AWARD**

Not Given

JUDGES

Chris Bacon

Geoffrey Bourne

Robert Lozier

Lauren Peckham

AWA CONFERENCE AUCTION REPORT

Sale prices for selected items from the AWA 2013 Convention auction records. Condition descriptions, if given, generally refer to physical rather than working condition. Every attempt has been made to ensure accuracy in reporting these results, but the AWA cannot assume responsibility for any errors that may occur.

ADVERTISING	
MARCONI SIGN, EXCELLENT	275
EMERSON STORE BANNER, GOOD	95
ZENITH STORE BANNER, FAIR	125
CHANNEL MASTER STORE BANNER, GOOD	55
PHILCO COLOR TV BANNER, GOOD	30
BOOKS AND MAGAZINES	
J. CLERK MAXWELL, MATTER AND MOTION, GOOD	190
JAMES TROTTER, INGRAM'S COMISE SYSTEM, GOOD	23
A.T. STORY, THE STORY OF WIRELESS TELEGRAPH, GOOD	20
WILLIAN LEES, ACOUSTICS, LIGHT & HEAT, GOOD	18
RADIO AGE, EXCELLENT	5
MERLE DUSTON, RADIO CONSTRUCTION 1920s, POOR	20
RADIO HANDBOOK, 7TH EDITION, GOOD	4
ARRL, 1934 HANDBOOK, GOOD	5
ZENNEK, TELEGRAPHIE SANS FILS, GOOD	40
NESPER DER RADIO AMATEUR, GOOD	30
EBERHART, MANUAL OF HIGH FREQ. CURRENTS, EXCELLENT	23
SHORTWAVE AND THE ROMANCE & REALITY OF TV '30, GOOD	55
MARCONI, MARCONI JUBILEE 1897-1947, GOOD	75
RADIO ENTERS THE HOME, GOOD	6
FRED T. HODGSON, NEW HARDWOOD FINISHING	12
SIR OLIVER LODGE, RAYMOND OR LIFE AND DEATH	5
POINCARÉ & MAXWELL'S THEORY	200
CRAWFORD, FRIENDLY IONOSPHERE, EXCELLENT	20
ORIGINAL GERNSBACK RADIO ENCYL, EXCELLENT	5
WIRELESS TELEGRAPHY - 1906, GOOD	15
SAMS, TRANSISTOR RADIO PHOTOFACTS, EXCELLENT	15
MAGAZINES GERNSBACK 1915, GOOD	170
THE INVENTOR OF THE VALVE, EXCELLENT	30
MICROPHONES	
RESLO RIBBON RV, EXCELLENT	55
CONDENSER MICROPHONE, GOOD	185
SHURE 558, EXCELLENT	175
ELECTRO VOICE V3, EXCELLENT	1175
HEIL DUAL ELEMENT FOR VINTAGE RADIO	85
OTHER	
AMRAD 2776 AMPLIFIER	350
PRESSLER GERMANY X-RAY TUBE & SCREEN (ABT 1910), EXCELLENT	170
WESTERN ELECTRIC 205D	550
DAYFAN 2 VARIOMENTERS, GOOD	35
DETROLA SPLIT GRILL, GOOD	20
FADA 855, GOOD	95
GEISSLER TUBE, EXCELLENT	35
MARCONI VARIABLE CAPACITOR, FAIR	15
HEATHKIT HD1401, GOOD	5
MIRAGE B1016-G, UNKNOWN	15
HEATHKIT HM-102 SWR, EXCELLENT	5
HEATHKIT VF-1, EXCELLENT	10
RCA 45 RECORD CHANGER, GOOD	10
EICOR 115 TAPE RECORDER, GOOD	10
ZENITH TV MODULES, GOOD	11
WEBCOR E P-2303-1 VISCOUNT II, HARMON KARDON "TRIO" TUBE AMP (STEREO), GOOD	35
LPB S-9 AUDIO MIXER WITH MANUAL, GOOD	60
EMERSON 516, GOOD	40
HOWARD MILLER WORLD TIME CLOCK, BOGEN M0100A, EXCELLENT	100
TANDBERG TAPE DECK, GOOD	25
BLAUPUNKT VERONA, FAIR	35
RCA 45 RECORD PLAYER, GOOD	40
BRANSTON 3-COIL HOLDER WITH COILS	50
RECEIVERS	
ADAMS-MORGAN PARAGON RA-10, DA-2, 10-R, GOOD	1600
AMRAD TUNER MODEL 3475, EXCELLENT	160
ATWATER-KENT MODEL 19, EXCELLENT	150
ATWATER-KENT MODEL 20, GOOD	120
ATWATER-KENT MODEL 30, GOOD	25
ATWATER KENT 40, POOR	5
BUSH DAC-90A, EXCELLENT	150
CANADIAN RADIOIOLA III, EXCELLENT	145
CANADIAN MODEL 93, UNKNOWN	225
DETROLA 342, GOOD	15
EMERSON 845, GOOD	5
FLEETWOOD TRANSISTOR RADIO, EXCELLENT	80
GE A 64, GOOD	35
GUILD SPICE CHEST, EXCELLENT	35
HALLICRAFTERS S-38, GOOD	160
HALLICRAFTERS S38B, GOOD	60
HEATHKIT AJ-10, GOOD	30
HEATHKIT HW-101, POOR	35
HEATHKIT SB-400, GOOD	65
LOEWE GERMANY 1926 OE 333, GOOD	800
MARCONIPHONE NUETRAGENERATIVE TYPE M3, EXCELLENT	175
MONTGOMERY WARD 62-177, GOOD	50
NATIONAL NC 98 WITH SPEAKER, UNKNOWN	200
NORTHERN R4, EXCELLENT	700
NORTHERN R-11, EXCELLENT	200
PHILCO 37-620, GOOD	10
PHILCO 38-62, GOOD	25
PHILCO 70, GOOD	80
RADIOLA X, GOOD	110
RCA R-7, EXCELLENT	65
SABA RADIO DKE38 GER. KLEINEMPFANGER 1938, GOOD	350

SCOTT CR328, EXCELLENT	30	ARCHTURUS WUNDERLICH, EXCELLENT	25
STERN AND STERN CONCERTONE L-33 (DC VERSION), EXCELLENT ..	200	BRITISH WESTERN 4104-D, EXCELLENT	125
VICTOR NORTHERN R21, FAIR	250	CROOKES CATHODE RAY DEFLECTING TUBE, EXCELLENT	100
ZENITH B-600 TRANSOCEANIC, GOOD	55	CUNNINGHAM (3) C-299, EXCELLENT	20
ZENITH CHAIRSIDE MODEL 5S-237, GOOD	125	DEFOREST OV2, EXCELLENT	95
ZENITH H500, FAIR	40	GE UV-201, EXCELLENT	30
ZENITH M730, GOOD	2	KEN-RAD UX-201A (TUBE MARKED RCA), EXCELLENT	10
ZENITH ROYAL 2000, EXCELLENT	35	LOEWE 2HF EXCELLENT, GOOD	180
ZENITH TRANSOCEANIC, FAIR	30	LOEWE-GERMANY 1926 2HF, GOOD	200
ZENITH 500, GOOD	45	LOEWE 3NF EXCELLENT	175
SPEAKERS		LOEWE-GERMANY (2) RECTIFIER, NG-30, 14NG, GOOD	10
DICTOGRAND SPEAKERS, GOOD	225	MALTESE CROSS TUBE ABOUT 1920, EXCELLENT	150
DYNA - SET OF 4 SPEAKERS, UNKNOWN	2	MARCONI OSRAM R5V, GOOD	35
PEERLESS REPRODUCER, FAIR	15	MULLARD DFA1 (201), GOOD	35
RCA VOCAROLA, GOOD	275	MULLARDD DR 100, GOOD	5
RCA 100-A, UNKNOWN	10	MULLARD O RA, GOOD	15
WESTERN ELECTRIC 360 (HORN), FAIR	75	NORTH ELEC. 101 F	195
TELEGRAPH		NORTH ELEC. 203B	45
RUSSIAN TELEGRAPH KEY, EXCELLENT	30	NORTH ELEC. R-221D	15
ITALIAN MILITARY SPARK KEY, FAIR	25	NORTH ELEC. 205B	125
VIBROPLEX CHROME BUG, GOOD	45	NOWAC AUDION, 111-A, EXCELLENT	110
WESTERN UNION, EXCELLENT	120	PHILIPS D-11, GOOD	40
TEST EQUIPMENT		QRS REDTOP POWER TUBE, EXCELLENT	45
AUTOMATIC SWR/POWER METER, EXCELLENT	5	RADIOTRON. (1) UV400 (1) C-301A	115
EICO 1030 POWER SUPPLY, FAIR	5	RADIOTRON (1) UV-200	20
GENERAL RADIO WAVE METER, EXCELLENT	55	ROGERS 280 GLOBE	30
GENERAL RADIO, GR PRECISION CAP 722-N, GOOD	15	SIEMENS-GERMANY 1926 TYPE BA, EXCELLENT	100
GR 1340 PULSE GENERATOR, GOOD	15	SOVEREIGN 501, GOOD	40
GENERAL RADIO 1531-A, UNKNOWN	15	SYLVANIA (2) SV-199, UNKNOWN	5
HEATHKIT EDW-27, EXCELLENT	10	TELEFUNKEN EVN 171, EXCELLENT	170
HEATHKIT HO-10, GOOD	25	TELEFUNKEN 171, EXCELLENT	170
HEATHKIT IM-11, GOOD	9	TELEFUNKEN RS 391, EXCELLENT	35
HEATHKIT O-3 SCOPE, GOOD	23	TELEFUNKEN RV 218, EXCELLENT	110
JAMES MILLEN TYPE 90651 GRID DIP METER, GOOD	15	TELEFUNKEN RL12P35, EXCELLENT	20
LEEDS & NORTHRUP 1-49, EXCELLENT	30	TELEFUNKEN RE-88, EXCELLENT	70
RADIO CITY MODEL 802N, GOOD	40	TELEFUNKEN RS-69, EXCELLENT	40
SUPERIOR INST. TW-11 TUBE TESTER, GOOD	355	UNKNOWN (1) 6E5	20
TEKTRONIX 200C, GOOD	25	UNKNOWN (2) U0A	70
TRIPLETT TUBE TESTER, UNKNOWN	150	UNKNOWN (1) UV-202	85
TRIPLET T 1503, EXCELLENT	35	UNKNOWN (3) UX99	30
WESTON 156, FAIR	5	UNKNOWN (6) 245 (GLOBE)	175
TRANSMITTERS/TRANSCEIVERS		UNKNOWN (6) 201-A (TWO W/ BRASS BASE)	65
BULLDOG ONE-INCH SPARK COIL, EXCELLENT	100	UNKNOWN 6 PIECES TYPE 280, GOOD	85
HAMMURLUND CB-23 TRANSCEIVER, GOOD	13	VALVO VCL-11, VY-2, EXCELLENT	20
HALLICRAFTERS FPM-300, GOOD	130	VAN HORNE 5VC	25
HEATHKIT DX 60B, EXCELLENT	45	WELSH WT-501, GOOD	80
HEATHKIT SB 300 TRANSMITTER	70	WL-787, EXCELLENT	250
HELIKON U-306, GOOD	140	WESTERN ELECTRIC 205D, 4101D DISPLAY, FAIR	40
TUBES		WESTERN ELECTRIC 212D, GOOD	150
ARCHTURUS (2) TYPE RA-1, GOOD	35	WESTERN ELECTRIC 216-A, GOOD	95
		WESTERN ELECTRIC 216A	10
		WESTERN ELECTRIC 215A	50
		WESTINGHOUSE UX245, GOOD	35
		WESTINGHOUSE 803 VT106, EXCELLENT	10

RADIO REHAB 101

EDITED BY **DICK PARKS**, 2620 LAKE RIDGE CT., OAKTON, VA 22124
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Rescued From the Trash

When I was a kid just after World War II, my pals and I haunted local dumps, scrounging mechanical and sometimes radio parts when and where we could find them. Is it any different now? In my neighborhood, the trash trucks come around on Wednesdays, but most often, folks' castoffs lie deep inside "supercans." Fortunately, bulkier items sometimes sit to one side on the curbs, and that's where I saw the great old radio pictured here. It is, or was, a Crosley 66TW from about 1947. They were very popular. In fact I grew up with a console version incorporating the same chassis.

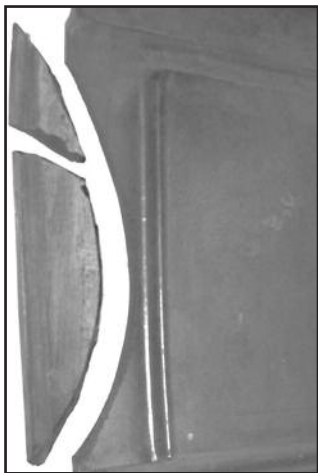
I grabbed this one from the curb like a thief in the morning.

When I got it on the bench, the visible damage was: (1) a big chunk out of the Bakelite on the right side; (2) all four knobs gone; (3) no speaker or power cord; (4) warped and cracked dial cover; (5) no back cover with loop antenna.

Fatal, right? A bad cabinet means parts only? No speaker means a difficult hunt for just the right one? Nobody wants one of these sets without the correct knobs... But as it happens, I had another white Crosley with a smashed cabinet—could I match pieces and at least make a whole one for this set? What would you do?



The Crosley as found at the curb presented a rehab challenge.



Pieces taken from another Crosley 66 (left) made a good patch (right) for the broken out section on the side of the cabinet.



The results of my completed radio hacking.



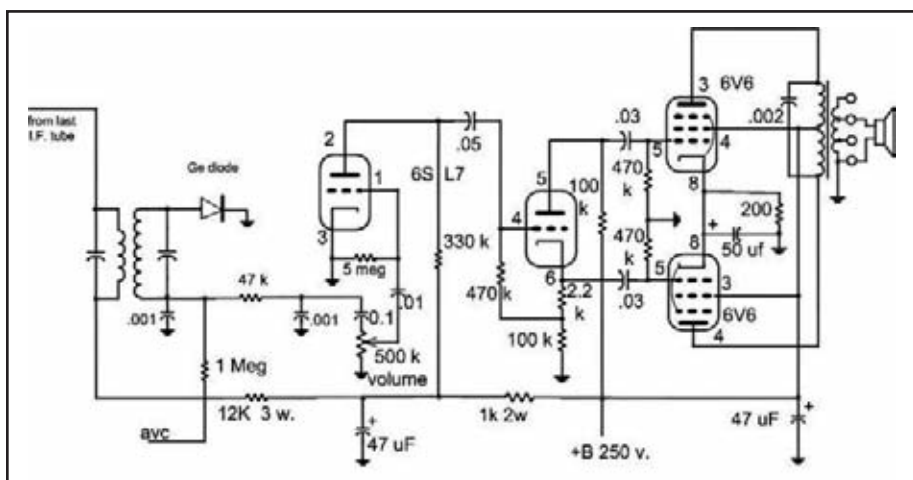
Enough with the rhetorical questions. I studied the pieces of cabinet I had and found one that would do the trick if I could cut it to fit the broken out spot. This radio could live again! I roughed out some pieces from the smashed cabinet to fit the opening approximately, then ground them for a more exact fit. There was a lot of black Bakelite dust!

Once the pieces were trimmed to my liking, I epoxied them together and sanded the area down after the epoxy had set. Some coats of red spray enamel gave it a modern touch and probably ruined its value on eBay. I also bent a $\frac{1}{8}$ inch piece of Lexan for a new dial cover. Turning to the chassis, I found wrong tubes in the sockets and an open primary in the power transformer.

The junk box offered a half-dozen potential replacements and lots of tubes. And this

set was an ideal candidate for radio hacking, a dark art we have all practiced when no one was looking. It involves making intentional, sometimes radical, changes to original circuitry. I decided to try a trick I'd been thinking about: conversion to push-pull audio. To do this, you put an output tube where the rectifier tube went, changing the power supply to silicon. Then you change the second detector/first audio tube to a suitable double triode, say a 6SL7 or the like, and use its second half as a phase inverter. Of course, you'll need a new output transformer.. See my schematic.

The resistor values above are those I settled on after some trial and error and after adding a big dropping resistor to get the B+ near 250 volts where I wanted it. The tube
(continued on page 47)



Schematic of the Crosley as modified.

RADIO REPRODUCERS

EDITED BY **BUFORD CHIDESTER**, 785 LOCUST ST., MOUNT WOLF, PA, 17347
E-MAIL speakerpeople@comcast.net. PLEASE INCLUDE SASE FOR MAIL REPLY.



The Crosley Musicone

The Crosley radio brand is one that most collectors are familiar with. Powel Crosley conceived of the company in early 1921 when he decided to buy his son a radio. Finding that the price was higher than he wanted to pay, he took matters into his own hands and learned how to build his own. The Crosley Manufacturing company grew out of this incident and was very successful in manufacturing radio and related products.

Crosley purchased Precision Equipment Company (Trade name, "Ace") in 1922 and continued to manufacture radio related products under both names. The reason was that Precision had the all-important Armstrong license while Crosley did not. Later in the 1920s, Powel Crosley decided to combine the two companies into one, naming the new firm "The Crosley Radio Corporation," the name we're familiar with today. This eliminated the Armstrong license problem.

The Crosley Radio Corporation did very well, going on to manufacture many different products. This variety of products was one factor in the company's success. They offered many different radio models, as well as components such as tube sockets, cabinets etc. Some of these were sold to other firms, including A.H. Grebe. & Co.

In 1924 Powel Crosley expanded again, purchasing a large share in de Forest Radio Corp. Ltd of Canada and forming a new company, separate from Crosley, known as de Forest-Crosley. Just a comment at

this time: Now I know why not only Crosley but also de Forest used that dreaded pot metal in their products.

Crosley's line of radio speakers included the Crosley "Musicone." In today's market these speakers often turn up at radio shows,

auctions and flea markets. Unfortunately time has taken its toll on most of them, creating the need for major restoration due to deteriorated pot metal, defective drivers, or defective or missing cones. I have seen many Musicone frames without an intact the driver/reproducer or cone. This gives the collector a major restoration project.

I decided to write this article to bring forth some interesting variations, normally not noticed by the collector, that I have found in these speakers. Although

Crosley manufactured lots of different models, I just want to talk about the larger Musicone model. It is sometimes is labeled "Musicone" or "Musicone B." Crosley also manufactured a small 12" version of the Musicone that is very common in the market.

I have found what appears to be three different models, or varieties, of the same Musicone design. They all have the same frame, but have either a different logo or a different driver. Figure 1 shows a Crosley Musicone B. It has a smooth bronze/gold finish and serial number 0430913. The sample of Figure 2 has the same frame and color as the that of Figure 1 but does not have the designation "B." It bears serial number 0483317. Figure 3 shows a unit



A 1927 Crosley ad mentions both large and small Musicones.



The Crosley Musicone Model B. Like all Musicones it can be displayed with either side facing front.

with the same logo and frame color as that of figure 2, but it has the famous Crosley crystal paint texture. It also has a small hole in the center part of the frame to access a screw for adjusting the reproducer volume control. Its serial number is 0564690.

All speaker frames have a cast iron base and pressed metal frame. Photos of the reproducer units (Figure 4) show the differ-



Fig. 1. The Crosley Musicone Model B Logo typical of large size Musicones.



Fig. 2. A large size Musicone designated "Super" rather than "B."



ence between the reproducer without a volume control and the reproducer with one. The unit at left is a type that seems to be standard for the models of Figure 1 and 2. On the right is the driver with volume control for the model of Figure 3. You can see the small screw at the bottom of the reproducer that will adjust the floating armature

back and forth between the magnetic pole pieces. The mounting holes are also different on these two reproducers.

Both reproducers have laminated magnetic pole pieces that slide into the pot metal frame. The balanced armature is a thin flat metal piece that is approx. 1/2" wide and 2" long sandwiched between the North and South laminated pole pieces. At the end of the armature is a thin rubber-type material that maintains the correct spacing between the armature and the ends of the pole pieces. This material has usually become hard and brittle and needs replacement for the reproducer to operate properly.

The straight one-inch driver pin that attaches to the cone is soldered to the armature. This fine (033") wire is usually broken off and must be replaced. The end that attaches to the cone is threaded with 2-56



Fig. 3. A large size Musicone with "super" designation, a volume adjusting screw and the special Crosley crystal paint texture.

threads. The cone is fastened to it with a single tapered round nut and cup washer on the inside of the cone and a nine point star with aluminum thumbnut on the outside.

The cone is made of a green/brown textured paper with designs in gold. The front has gold circles with a morning glory type floral pattern. The backside, or inside, of the cone has a gold floral design with what appears to be a choir at the top. Some of the larger Musicones have cones made of the same textured paper, but with the Greek Key design found on the smaller Musicones. This type of cone has been documented but is rare.

Although the speaker can be displayed with either side showing, you can see in the

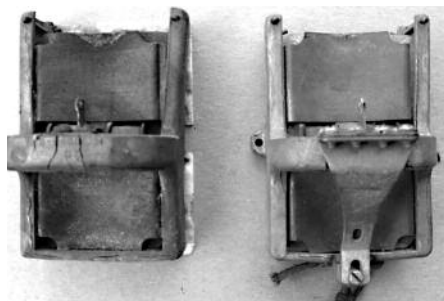


Fig. 4. Two variations of the Musicone reproducer. Note volume adjusting screw at bottom of right hand unit.

Crosley ad accompanying this article that the outside of the cone faces front. 

RADIO REHAB, *cont. from page 44*

manual was my guide, and when everything was working, I installed an output transformer from a junk amplifier, an RCA jack for the phono input, rewired pilot lights, and a one-amp line fuse and new power cord.

I thought about making a new back for this chassis using a traced pattern from another model 66, but decided just to wind a

ferrite loop for shortwave and use the long wire connection for the broadcast band. In the rear view of the completed set, you can just see the loop held up under the cabinet top with Velcro. Now this survivor can put about 8 watts into a bass reflex speaker cabinet and sound pretty good playing big-band music. Too bad the Crosley doesn't have FM. 

SILENT KEYS

We record the passing of the following AWA member with deep regret.

RONALD J. DOERING, WA9QNN, 66, (6-7-13), worked for a number of companies and concluded his career with the Department of Defense in Milwaukee. He earned an engineering degree from the School of Engineering, University of Wisconsin-Madison. Doering was an avid radio amateur operator and received a certificate for contacting "hams" in 200 countries using code. In addition, he gave many family and friends their tests for novice radio

amateur licenses. Doering also enjoyed buying and repairing old console radios from the 1930s and 1940s. In addition to radio activities, he enjoyed fishing, hunting and spending time with family and friends. Doering served in the U.S. Army during the Vietnam War from 1969 to 1970. He was a resident of White Lake, WI and formerly lived in Kaukauna. Thanks to Nancy Doering and Wichmann-Fargo Funeral Home and Crematories.

Please submit all information about members who have become Silent Keys to Charles S. Griffen, W1GYR, 400 Seabury Drive, Apt. 4153, Bloomfield, CT 06002-2660. Silent Key notifications must confirm the person's death by one of the following means: a letter from a family member, a copy of a newspaper obituary notice, a copy of a death certificate, a letter from the family lawyer or the executor or mail returned by the U.S. Postal Service marked "Deceased."

RESEARCHING THE REAL INVENTOR OF RADIO TELEGRAPHY

© Eric P. Wenaas

The history of wireless communication is replete with stories of important inventions and the inventors who had priority for discovering them. There have been many controversies about priorities of invention over the years, but none so great as who has priority in the invention of radio. Priority depends upon the way the question is posed, and historically the question of who invented radio has often been posed as “Who was the first to demonstrate transmission and reception of intelligible signals using Hertzian waves?” The phrase “intelligible signals” in this context means signals conveying intelligence such as with Morse code—certainly more than conveying simple signals indicating a “Yes” or “No.” Without the caveat of conveying intelligence, the first one to transmit and receive Hertzian waves for any purpose could be considered the inventor of radio.

While there have been a number of candidates for priority in sending and receiving intelligible signals, the focus of this article is on the controversy over the priority of Sir Oliver Lodge versus Guglielmo Marconi. This has been contested ever since Marconi’s English patent for his method of wireless telegraphy was first published on July 2, 1897. The controversy continues to this day with strong arguments having been made in behalf of both. The lack of consensus is evident in recently published books, some of which have awarded priority to Marconi while others have awarded priority to Lodge.ⁱ

Recently discovered in the course of another research project were two previously unchronicled documents that have a direct bearing on this issue. In fact, they should settle it once and for all. One was published

in 1894 and the other in 1907. Both contain new first-hand accounts by Oliver Lodge of his Oxford telegraphic demonstration of August, 1894, around which the entire argument of priority revolves. Lodge’s new accounts of this demonstration will be compared and contrasted to his previously chronicled claims for telegraphy there. But before that, some background material will be presented to provide the basic parameters of the controversy.

Background

For most of the 20th century, Marconi was accorded priority as the first to transmit telegraphic messages by Hertzian waves. Perhaps the most significant figure to accord Marconi’s priority was Judge William K. Townsend, who in upholding the validity of Marconi’s original patent in his decision rendered on April 11, 1905 in *Marconi v. de Forest*, stated:

It would seem, therefore, to be a sufficient answer to the attempts to belittle Marconi’s great invention that, with the whole scientific world awakened by the disclosures of Hertz in 1887 to the new and undeveloped possibilities of electric waves, nine years elapsed without a single practical or commercially successful result, and that Marconi was the first to describe and the first to achieve the transmission of definite intelligible signals by means of Hertzian waves.ⁱⁱ

Süsskind in his well-known series of articles entitled “The Early History of Electronics,” which appeared in multiple issues of the *IEEE Spectrum* published between 1968 and 1970, echoed Townsend’s opinion.ⁱⁱⁱ

A few years later, Hugh Aitken in his award-winning book published in 1976, *Syntony and Spark – The Origins of Radio*,

made a strong case that Lodge sent telegraphic messages during the course of a lecture he gave at a meeting of the British Association at Oxford on August 14, 1894. If true, this would have predated Marconi's earliest telegraphic experiments by almost a year.^{iv}

Aitken's book won the Dexter Prize awarded by the Society for the History of Technology as the best book published on the history of technology that year, thereby attracting wide attention among historians. Aitken presented evidence that Lodge had demonstrated signaling by Morse code at Oxford in 1894, quoting explicit claims that Lodge had done so by both Lodge and his close friend and associate, Silvanus Thompson.

Aitken posed the following questions, answered them in the affirmative with supporting evidence, and concluded that Lodge must be recognized as the inventor of radio telegraphy:

Did Lodge in 1894 suggest in public that his equipment could be used for signaling? Did his lecture refer to the application of Hertzian waves to telegraphy? Did he demonstrate transmission and reception of Morse code? The answer would seem to be affirmative in each case. In this sense Lodge must be recognized as the inventor of radio telegraphy.^v

Respected historians and authors began to give priority to Lodge over Marconi, often repeating arguments appearing in Aitken's book. After many years, Aitken's book attracted the attention of Sungook Hong, Associate Professor of History at the University of Toronto. In the first few chapters of his book: *Wireless: From Marconi's Black-Box to the Audion*, published in 2001, he effectively refuted most of Aitken's arguments for Lodge's priority.^{vi}

While Hong was convincing with his rebuttals, he never cited any proof that Lodge

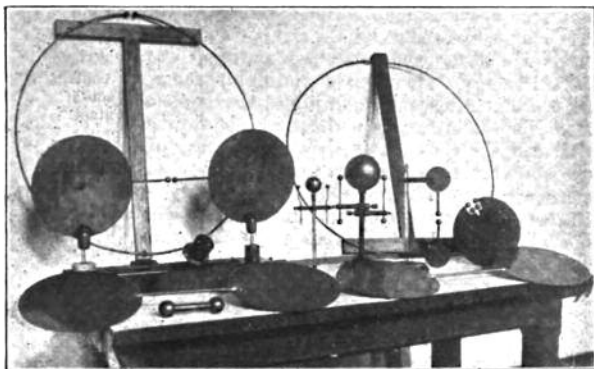


Fig. 1. Oliver Lodge used this equipment at Oxford to illustrate the quasi-optical properties of Hertzian waves and the effects of syntonity in tuned circuits.

did not demonstrate telegraphy at Oxford. Absence of documentary proof may not be a concern for some, but others will be quick to point out that absence of proof is not the same as proof of absence, and that Lodge should be believed because he was a highly respected and honorable man.

Hong did not address the implication of his conclusions on Lodge's many claims of having demonstrated telegraphy at Oxford, namely that either his memory must have failed him or, worse yet, that he altered the truth in order to claim undeserved recognition. Hong avoided a direct attack on Lodge's character by claiming a nameless group of "British Maxwellians" were responsible for "the re-characterizing of Lodge's 1894 Oxford demonstration as the first demonstration of wireless telegraphy" because they "thought that they should not hand over an ether monopoly to Marconi, who they thought had violated the rules of the game."^{vii}

In fact, it was primarily Lodge and Silvanus Thompson who re-characterized Lodge's demonstration as wireless telegraphy—not a nameless group of Maxwellians. Indeed, both the Maxwellians and the press took Marconi to task for copying or duplicating Lodge's equipment and claiming it as his own, but not for claiming priority in telegraphy.

For example, *The Electrician* was perhaps

the first to criticize Marconi for the claims in his patent. An article in its Nov. 12, 1897 issue made with the following accusation:

Both at Oxford and at the Royal Institution, Dr. Lodge described and exhibited publically in operation a combination of sending and receiving apparatus constituting a system of telegraphy substantially the same as that now claimed in the patent we have referred to.^{viii}

The article was accompanied by two photographs of much, but not all, of Lodge's apparatus that was used or displayed at the Oxford demonstration (see Figs. 1 and 2). However, as Hong pointed out, the article did not claim Lodge had demonstrated telegraphy; it claimed only that Lodge's apparatus was substantially the same as that which Marconi described in his patent for wireless telegraphy.

The first claim that Lodge had transmitted telegraphic signals at Oxford in 1894 was made in passing by Silvanus Thompson in a paper he read at the Society of Arts on March 30, 1898.^{ix} While this claim attracted very little attention, his next claim, made in a series of exchanges with Marconi in five issues of the *The Saturday Review* in 1902 attracted wide attention.

Thompson began the exchange with a vitriolic attack on Marconi in the April 3, 1902 issue, where he stated:

It seems like the irony of fate that Professor Lodge, the well-known Principal of the University of Birmingham, after expounding the principles of wireless telegraphy in London and at Oxford in 1894, should find himself pushed aside, first by the Italian, who by dint of advertisement gains the public ear...^x

Thompson made the fatal mistake of claiming that Lodge expounded wireless

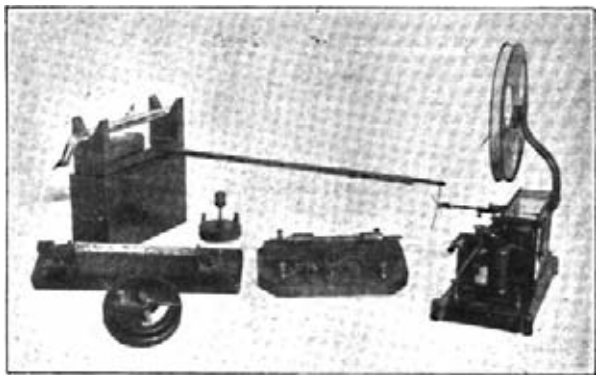


Fig. 2. Lodge displayed several coherers at Oxford including a point-contact spiral spring coherer (lower left), a Branly-type filing coherer (above the point-contact coherer), a filing coherer mounted on a board with a continuous buzzer restoring the coherer back to a sensitive state (center); and a filing coherer (upper left) tapped periodically by a rotating spoke attached to the clockwork mechanism of a siphon recorder (right).

telegraphy not only at Oxford, but also in London (at the Royal Institution). Lodge stated more than once that he did not mention or demonstrate telegraphy at his demonstration at the Royal Institution in London, thereby belying Thompson's claim. Indeed, Lodge's 1894 book, *The Work of Hertz and Some of His Successors*, which documented his London demonstration in detail, made no mention whatsoever of telegraphy. Thompson impeached himself in this exchange of letters more than once, and in such a biased and acrimonious manner that his pronouncements of Lodge's priority are not reliable.

Ironically, it was Thompson who framed the issue of priority by a retort appearing in *The Times* immediately following the exchange of letters in *The Saturday Review*. In response to a letter from by a Marconi supporter to *The Times* pointing out that Marconi had transmitted signals much further than Lodge, Thompson quipped: "*But that is not the point. The point is, Which of the two was the first to send a wireless telegram?*"^{xi}

Lodge's Claims for Telegraphy at Oxford

By all published accounts, Lodge did not

make a claim for demonstrating telegraphy at Oxford until 1923, almost 30 years after the lecture. Lodge began with a relative modest claim in the Sept. 5, 1923 issue of *Wireless Weekly*, a claim which soon evolved into a more specific claim in his book, *Talks About Radio*, published in 1925:^{xii}

It was now possible to use them [coherers] for roughly and imperfectly transmitting signals in the Morse code either by the direct use of a Thompson marine speaking galvanometer or a siphon recorder...In August 1894, I exhibited this method of signalling at the British Association in Oxford.

Lodge's claim matured into a final form in 1926, which he repeated several times in subsequent writings:

The possibility of actual signalling by this method was insisted on at Oxford... When the Morse key at the sending end was held down, the rapid trembler of the coil maintained the wave production, and the deflected spot of light at the receiving end remained in its deflected positions as long as the key was down; but when the key was only momentarily depressed, a short series of waves was emitted, and the spot of light then suffered a momentary deflection. These long and short signals obviously corresponded to the dashes and dots of the Morse code; and thus it was easy to demonstrate the signalling of some letters of the alphabet, so that they could be read by any telegraphist in the audience—some of whom may remember that they did so.^{xiii}

These claims directly contradict a document published in 1907^{xiv} where Lodge provides details of the telegraphic nature of his demonstration in 1894. The document entitled *Report of the Select Committee on Radiographic Convention* was prepared for the British House of Commons to assist them in determining whether or not it was in the national and public interest to ratify the Radiotelegraphic Convention, signed by British representatives attending the Convention in Berlin on Nov. 3, 1906. Committee members invited representatives from several British wireless companies including the Marconi's Wireless Tele-

Figure 3.

Oliver Lodge Testimony

Q. Would you mind telling me what was the first date and place at which you transmitted intelligible messages by means of the Hertzian waves?

A. You mean by intelligible messages on the Morse Code?

Q. Practically—yes.

A. Which conveyed intelligence?

Q. Yes, more than a mere signal which could be construed to be "Yes" or "No."

A. In my early experiments, and in the demonstration of 1894, I did not attempt to transmit words by Morse code; I used a Morse key and a mirror-signalling instrument, so that if I had been an expert telegraphist it would have been quite easy to send words, but all I did was to send short and long signals.

Q. That is to say, you claimed that you showed wireless telegraphy potentially but not actually.

A. That is so—not actually—no.

Q. But I gather from you that the idea of using Hertzian waves for practical telegraphic work did not occur to you until after you had heard of Marconi's achievement?

A. It occurred to Dr. Muirhead, who spoke to me about it, and who has his mind on telegraphy; but it did not especially interest me—not so specially.

Q. In fact it occurred to him, I understand you to say, after Marconi's?

A. No, after the 1894 demonstration.

Q. Before 1896?

A. Yes, in 1894 he was present at my lecture.

Q. But previous to 1896 you did not give the invention any personal application?

A. No.

graph Company and the Lodge-Muirhead Company to testify before the Committee, and the resulting testimony was recorded and published in July of 1907. Oliver Lodge was one of the two called to testify on behalf of Lodge-Muirhead on April 26, 1907. As far as I am aware, Lodge's testimony reproduced here (Fig. 3) has never been chronicled before, certainly not by Aitken, Hong or any other author dealing

with this controversy.

For clarity, the letter “Q” has been inserted before each question asked by the examiner for the Committee, and the letter “A” has been inserted to indicate Lodge’s response. The examiner begins by asking Lodge where and when he first sent intelligible signals by means of Hertzian waves, and Lodge, after asking for a clarification, responds that he did not attempt to transmit by Morse code in his early experiments, and that all he did in his 1894 demonstration was to send short and long signals.

By stating that he sent long and short signals, Lodge is clearly referring to the Oxford demonstration—not the earlier demonstration at the Royal Institution in London. The examiner then asks if Lodge showed wireless telegraphy “potentially, but not actually,” and Lodge responds “not actually—no.” The examiner then asks if the idea of using Hertzian waves came to him after he had heard of Marconi, and Lodge responds that it came not to him, but rather to Dr. Muirhead.

After the examiner asks for clarification, Lodge then says that it came to Muirhead after the 1894 demonstration. So, Lodge is saying that it was not his idea, and further, that the idea of telegraphy by Hertzian waves came to Muirhead *after* the 1894 demonstration—clearly the demonstration to which he referred earlier—that is, the Oxford demonstration. If the idea of telegraphy by Hertzian waves was conveyed to Lodge after his Oxford lecture, then he clearly did not refer to or demonstrate telegraphy at Oxford.

This conclusion is supported by another unchronicled document that clearly indicates Lodge did not make a telegraphic presentation at Oxford. The document is an abstract of Lodge’s Oxford demonstration entitled “Hertzian Waves” that appears in the August 24, 1894 issue of the Weekly Supplement to *The Electrical Engineer*.^{xv}

It is clear that Lodge himself prepared the abstract not only because of the byline, “By Prof. Oliver Lodge,” but also because of the opening line: “The author described...” Since Lodge did not write a

paper covering his lecture, the only document he could have authored was the abstract itself. Further, bylines were not used by the *Electrical Engineer* when the summaries were prepared by editors of the magazine.

For example, see the summary of Lodge’s lecture at the Royal Institution of London in June in the same journal, which was clearly prepared by the editors and has no byline.^{xvi} It begins with “*Prof. Oliver Lodge discoursed...*” Heretofore, historians and biographers have assumed that Lodge did not document any account of his Oxford lecture,^{xvii} but it now appears that he did.

There are three points to be made about the contents of this abstract. First, there is absolutely no mention of telegraphing. Second, there is no mention of long-distance transmission of signals from distant rooms. Instead, it states:

The coherer could detect the surgings in a sphere 5 ft. away when charged by an electrophorus, or the oscillations of an electric lighter; in Liverpool a sphere nearly 70 yards distant had affected the instrument.

This statement strongly implies that no long-distance signaling occurred at Oxford—otherwise the abstract would have referred to long-distance signaling at the Oxford lecture rather than earlier at Liverpool. Thompson had claimed that Lodge’s demonstration of telegraphy at Oxford was accomplished with signals coming from the Clarendon Laboratory at a distance of 60 or so yards, and so it appears that Thompson was once again dissembling about Lodge’s telegraphy at Oxford. Third, the abstract indicates that the shorter and longer pulses—often referred to later by Lodge as evidence of the “dots” and “dashes” of Morse code—were made in the context of demonstrating persistence of vision, not in the context of telegraphy:

Between the stimulus of light and that of darkness there would be persistence of vision. Dr. Lodge showed an experiment to illustrate this, the coherer being restored by periodic tapping applied by a clockwork.

For a continuous radiation [i.e., long pulses] the coherer showed continuous indications, which died away when the radiation ceased.

Conclusions

Lodge testified unequivocally that he did not send words by Morse code in the 1894 demonstration. Specifically, he stated: "... all I did was to send short and long signals." Thus, he did not even transmit letters of the alphabet by Morse code, as he later claimed. The abstract of his Oxford lecture supports the contention that he transmitted short and long signals to demonstrate persistence of vision, not telegraphy.

Perhaps he later reinterpreted his short pulse of radiation as being an "S" and his long pulse as being a "T," but that is not telegraphy; otherwise, anyone who experimented with transmission and reception of Hertzian waves by sending pulses of different lengths for any reason could make the same claim.

Lodge also testified that the idea of Hertzian telegraphy was communicated to him by Muirhead "after the 1894 demonstration," which, by his previous reference to transmitting short and long pulses in the demonstration of 1894, was a clear reference to the Oxford demonstration. Lodge then testified that Muirhead's suggestion of Hertzian telegraphy "did not especially interest me." Clearly, it did not because Lodge did nothing more with Hertzian waves after Oxford until Marconi's method of telegraphy with Hertzian waves became known in England two years later.

It should be noted that Sungook Hong arrived at exactly the same conclusion, albeit using a different set of source documents. In that sense, the two efforts are complimentary rather than duplicative. The main difference between the two is that Hong concludes there is no real evidence to support Lodge's claim of telegraphy at Oxford, while the conclusion drawn here is that Lodge's testimony and abstract provide irrefutable evidence that he did not demonstrate telegraphy at Oxford.

It is instructive to contrast Lodge's previ-

ously unchronicled testimony about his Oxford demonstration presented here with the conclusion reached by some of the more prominent historians in the last 40 years. Clearly, these respected historians came to conclusions about his Oxford lecture that are completely at odds with Lodge's testimony:

- Peter Rolands (1990): *On 14 August, at the British Association meeting in Oxford, Lodge gave the world's first demonstration of radio signalling in Morse code using electromagnetic waves.*^{xviii}
- George Basalla (1988): *In 1894 Lodge...sent signals in Morse code across a distance of 180 feet and discussed the possibility of radio telegraphy.*^{xvix}
- Roland F. Pocock (1988): *Lodge had shown how Morse signals could be transmitted and received by Hertzian radiation...*^{xx}
- Hugh G. J. Aitken (1976): *Did Lodge in 1894 suggest that his equipment could be used for signaling...Did he demonstrate transmission and reception of Morse code? The answer would seem to be affirmative in each case.*^{xxi}
- W. P. Jolly (1974): *...a few letters were transmitted for the benefit of the audience. This was the first public demonstration of radio telegraphy...*^{xxii}

There are still a few loose ends yet to be tied up in Part II of this article. For example, could Lodge have actually demonstrated telegraphy using Morse code with the apparatus he used at Oxford? Was Marconi's system essentially the same or substantively different from the apparatus Lodge used at Oxford? Why did Lodge wait almost 30 years after his Oxford lecture in 1894 before he made his first claim that he demonstrated telegraphy there? Did Lodge merely stretch the truth or did he make false statements?

REFERENCES

- i For example, Russell W. Burns awarded priority to Lodge in his book *Communications: An International History of the Formative Years* (Institution
(continued on page 60)

DEVELOPMENT OF THE UNIVERSAL, HONEYCOMB, AND DUOLATERAL COILS FOR RADIO APPLICATIONS

In the 1890s, a new method of winding “cops,” the packages of yam and thread used in the manufacture of textiles, became so popular that by 1900 it was being described in the cotton industry as the “universal winding system.” It depended upon a new type of automatic winding machine that could produce compact and mechanically self-supporting coils with layers of close wound thread or yarm, each layer wound at an angle with respect to the underlying layer.

The machine could also handle other materials, and in 1905 Elbert W. Jodrey filed a patent for an electrical coil consisting of separate, self-supporting sections, each

with the universal winding. The as-issued patent was assigned to the General Electric Company [1]. An end-section of the coil, viewed in the radial direction, is shown in Figure 1.

The machines that made these windings possible were manufactured and sold by The Universal Winding Company, and the firm expanded its textile company sales to include the electrical industry, where universal coils were accepted for use in some limited applications. Later, in 1915, Universal Winding introduced a new machine intended to produce an electrical coil with a broader range of usage.

The new type of coil became much in demand, and the electrical industry began referring to it as the “universal coil,” ignoring the way that the name had been originally used for the earlier coil, as well as the fact that the winding itself was a conventional multilayer solenoid. The only property of the coil that was related to the universal category was the presence of thin-thread windings which separated the layers of wires, and which were laid in the universal pattern [2].

Nevertheless, the then-minor part of the electrical industry dealing with radio products retained the universal name for the original type of coil, and that has led to confusion ever since. Several years later, an engineering article clearly described both types of Universal Winding’s machines and the coils that they produced, even referring to the universal-wound insulation for the newer type of coil. However, the electrical definition for a universal coil was given in an accompanying illustration, and the radio industry definition continued to be ignored [3].

An electrical exposition in 1916 included

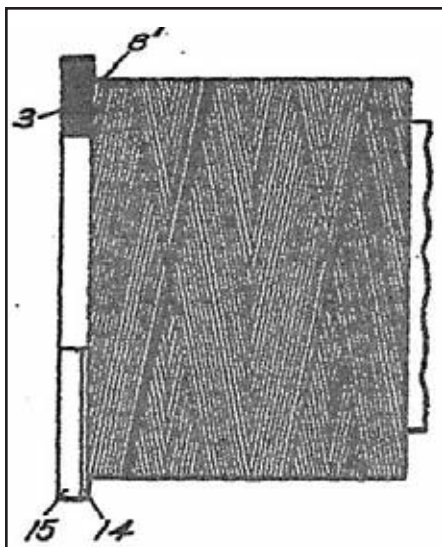


Fig. 1. The end section of a Jodrey coil, looking toward the axis and showing a typical universal winding, reproduced from his patent [1].

a Universal Winding Co. display with both types of machines in operation, and the newer machine was said to have attracted much attention [4]. Also mentioned was the use of the earlier type to wind coils used by the government for wireless telegraphy, but no details were given. The 1917 exposition again had these machines in operation, and a display of coils made by the Coto Coil Company was included [5]. Coto Coil had just been incorporated, and was a subsidiary of Universal Winding [6] [7]. It was soon to be an important manufacturer and supplier of coils for radio.

The de Forest Radio Telephone and Telegraph Co. had a Navy contract for long wave receivers in the 1917-1918 period, and from the description given by one source, the tuning coils were almost certainly universal-wound [8]. These were supplied by Coto Coil, using parent-company Universal Winding's machines. Coto Coil also began selling to other businesses, and it was joined by another company at some point in doing so.

This was the Radio Distributing Company, and in a Fall-of-1919 advertisement it announced that its Radisco line of products was being made available to the amateur market through the company's agencies [9]. This included universal coils, although they were untypical in that the coil turns were slightly spaced. They made their appearance in October 1919 advertising [10], and frequently thereafter.

No information has been found revealing just when Radisco coils were first sold commercially, but hindsight's advantage makes it evident that a significant sales opportunity was lost by waiting until late 1919 to advertise to amateurs and experimenters. Cross-wound coils with somewhat better performance had already reached the market, giving Radisco stiff competition from the outset. In fact, large advertisements soon appeared stressing that "contrary to rumors spread by a competitor" Radisco coils were still being manufactured [11][12].

The universal coil and some other multi-layer types were good choices for long

wave tuning applications, and the long wave band was still the region of most radio traffic immediately following World War I. The fact that the Radisco coil was a late arrival in its availability to amateurs and experimenters placed it as a disadvantage from which it never recovered. Interest was already directed toward other types of coils. It was the new honeycomb coil and other designs that received most of the attention for tuning applications.

The question about who invented the honeycomb coil has never been satisfactorily answered, although it is known that three different inventors participated in its development. Priority of invention is sometimes based upon the date of a patent application, and if such were the case here, Morton W. Sterns would qualify. Sterns filed an application for a new form of cross-wound coil on February 10, 1919, and this was later divided and re-filed as two patents, both assigned to the Coto Coil Co. as issued [13] [14].

The Sterns coil had the same cross-wound arrangement as the universal coil, but now it was specified that the turns in every layer be separated rather than close-wound. The patent coverage was very broad, claiming a turn location that could range from a point directly above the nearest turn in the first underlying layer with the same wire direction, to a point midway between two such underlying turns. There was also the claim for a modification that included an insulating layer between adjacent layers of wire. However, there were no specific claims made for the soon-to-be-named honeycomb and duolateral coils, although both fall within the range of turn locations that were covered in the patent.

Sterns was both a businessman and an inventor with several patents, but practically nothing has been found about his participation in honeycomb coil development. He must have been associated in some way with Coto Coil, because his coil patents were assigned to that company, but nothing beyond that is known.

It is curious that only one person has been located that so much as mentioned

Sterns's name in connection with the honeycomb coil, but that person was certainly well qualified to comment. He was a radio engineer active during the period of time that included its invention. This was Donald McNicol, who later wrote a technically oriented book on the history of radio, and who made one brief reference to Sterns as the person who first introduced the honeycomb coil in America [15].

The other two men associated with the honeycomb coil invention were Thomas P. Giblin and Robert F. Gowen. Giblin was company manager at Coto Coil and Gowen was a radio engineer at the de Forest Radio Telephone and Telegraph Company when the first practical honeycomb coils were developed in the winter of 1918-1919 [8] [16, p.162]. Gowen had received approval to proceed with the manufacture of his innovative cabinet design—the unit or panel set. This consisted of a front panel assembly of individually mounted subpanel units, and Gowen wanted a self-supporting coil with a plug-in feature that would attach on the front of a subpanel for easy access.

The idea was based upon the external features of the coil that the de Forest Co. had used in the recently completed Navy long wave receiver contract [8]. Since Coto Coil had supplied the coils made earlier, Gowen made a trip to the Coto Coil factory to work out details for the new coil [16, p. 162].

The trip to Coto Coil was just one of a number of events in dispute concerning the invention of the practical honeycomb coil, as described in two conflicting articles. One of these was by a writer that had interviewed Giblin [17], the other by Gowen himself [8].

For Gowen, the trip was a significant two day event, during which he and Giblin worked together at one of the winding machines to produce the first coils conforming to an earlier idea of Gowen's about an improved coil with a honeycomb-like structure. On the other hand, the interview article described a lengthy period of development and testing by Giblin, which ultimately resulted in a practical honeycomb coil, and during which an (unidenti-

fied) engineer from a large manufacturing company paid a visit and quickly saw the advantages of Giblin's coil for radio applications. This was the only interview reference to what was very likely the Gowen trip to Coto Coil.

There were a number of other conflicting statements in the two articles, regarding the period from about 1917-1918 to May of 1919 during which an idea for a new coil evolved into a honeycomb coil for the de Forest unit panel receiver [8][16, p. 162][17]. Neither article referred to Morton W. Sterns, although the interview article included a history of earlier open winding developments dating back some 15 years. There was also a somewhat confusing mix of coil names used, perhaps due in part to the interviewer's lack of familiarity with them. The article concluded with a lengthy discussion of the duolateral coil, and its invention by Giblin, again with nothing said about Sterns.

The commercial development of the duolateral coil resulted from work beginning in the winter of 1919-1920, with Giblin as the only one of the three original inventors to proceed with it. Gowen did not dispute that Giblin developed it, but in his own version of honeycomb coil history he described that it was relatively easy to wind a duolateral structure, although it took most of his two days at Coto Coil Co. before he and Giblin were able to adjust the coil winding machine to produce the honeycomb configuration.

Gowen also commented that he thought that the two designs would have the same coil properties, and this may be why he continued to pursue use of the honeycomb structure. However, later measurements and operating experience showed that the duolateral had slightly better characteristics.

The one significant difference between the structures of the honeycomb and duolateral coils can be seen by comparing the diagrams in Figure 2, [18], where wire turns in one of the two sets of parallel layers are represented in cross section. These are shown one above the other for the honeycomb coil, while for the duolateral coil, turns for a given layer are midway between

turns of adjacent layers in the same direction. Photographs of the two coils side by side appear in Figure 3, [17].

Close inspection is needed to see the external differences in appearance, as viewed from an angle, but it is a different story when each coil can be hand-held to observe the cylindrical surfaces. A honeycomb coil presents hollow, diamond-shaped cells tapering toward the inner radius of the coil, with the entire length of a cell visible as viewed in the radial direction. In contrast, the upper layer of a duolateral coil is in full view, but only segments of the first underlying cross-wound layer can be seen, and there is no cell-like structure.

Giblin applied for a patent on the new coil in November of 1919, about a year after the first samples were wound [19], but it was not until the summer of 1920 that advertising began to appear [20]. This was a year after the de Forest Company began making honeycomb coils available separately from those supplied with the new line of receivers [21]. Coto Coil Company itself began advertising coils in the Fall of 1920, although early ads were for the honeycomb type rather than the duolateral [22].

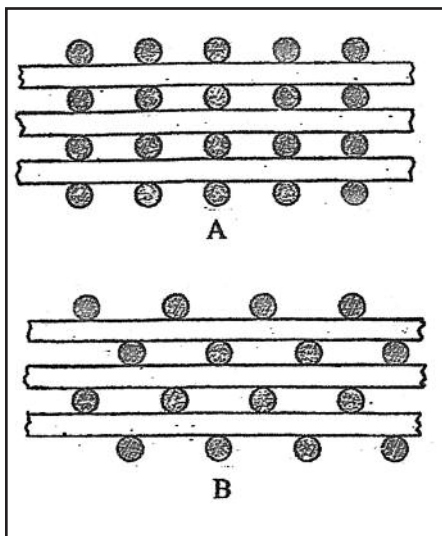


Fig. 2. A comparison of wire positioning for the honeycomb coil at A and the duolateral coil at B [18].

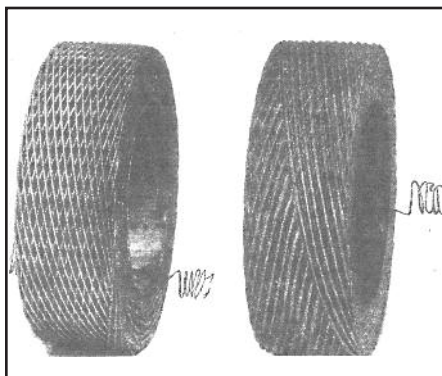


Fig. 3. External appearance of the honeycomb coil at left and the duolateral coil at right.

Advertising of duolaterals began by several companies after Giblin left Coto Coil in 1919, assigning his patent to the Commercial Radio Company of America. This was a company incorporated by him and two associates in May of 1919 [23]. However, other suppliers were the advertisers of the coils, beginning about June of 1920, and a detailed and informative article about it appeared that month [24]. Both types of coils became popular, with the duolateral usually priced a little higher, taking advantage of its improved characteristics. Suppliers often ran ads for a line of sixteen or seventeen different sizes, and superior performance was claimed for the entire range of wavelengths in use at that time. Meanwhile, Giblin was working on a still more efficient coil.

It was some time before Giblin completed additional coil development. This was a period when he also began two businesses, was associated with another, and participated in starting one of the early broadcast radio stations. Information about the new coil began appearing in the summer of 1922, with advertising referring to it as the Giblin-Remler coil [25]. The Remler Radio Manufacturing Co. gave very detailed tables of its characteristics, and in August there was article coverage in *QST* Magazine [26].

Those expecting to read about further refinement of the duolateral concept were no

doubt surprised that the new design no longer used a cross-wound winding for the multilayer coil. Instead, it was somewhat like the close-wound coil produced by the machine that Universal Winding had developed to appeal to the electrical industry for general applications. According to the *QST* article, it was a multilayer solenoid with the layers separated by universal-wound thread, and near the end where a turn changed direction and the voltage difference between layers was greatest, the thickness of the insulating layer increased as that point was approached.

Returning to the close-wound turns of a solenoid increased the accompanying distributed capacitance, but this undesirable property was more than just offset by separating the layers, and a more compact coil also resulted for a given inductance, as compared to coils with separated turns. Articles and advertising stressed its electrical advantages by including a table of laboratory measurements made at Harvard University's Cruft Laboratory.

At least one supplier soon included the Giblin-Remler coil with this information, along with the usual advertising for honeycomb and duolateral coils [27]. Seventeen sizes were offered, for bandwidth coverage ranging from 63 to 334 meters for short waves, to 5,300-23,800 meters for the very long wave band.

The general acceptance of all of these new coils was so extensive that it seemed that together they would soon dominate the radio industry for use in tuned circuit applications. In addition to the availability of manufactured coils, there were a number of magazine articles giving home-builders the necessary instructions for winding their own honeycombs or duolaterals, although the complexity of the Giblin-Remler coil was evidently too great to include for that segment of the radio public. Nevertheless, events soon showed that this high popularity would be short lived.

The acceptance of the honeycomb coil in 1919 and thereafter was accompanied by general agreement that it was an excellent choice for long wave applications, the fre-

quencies most used at that time. Nevertheless, within a few months controversy arose regarding its use at lower wavelengths covering what is now called the broadcast band and short waves. Radio amateur A. L. Groves concluded in the first of two articles in *QST* that neither the honeycomb coil nor the duolateral coil was more efficient than a single layer solenoid at such wavelengths [28]. In his second article, he emphasized their advantage for long wave use, but wrote that neither type was at all suitable for work below 500 or 600 meters [29].

Because commentary pro and con persisted, the technical editor at *QST* later added his comment in a 1924 article, writing that "a very carefully made single layer coil will give a definite improvement over all of them," referring to the Giblin-Remler coil as well as honeycombs and duolaterals [30]. Advertisers ignored the entire discussion and continued to offer such coils, claiming that they were ideal for all wavelengths.

This state of affairs occurred in an environment where significant changes were taking place. During the 1920s, radio evolved from a minor specialty in the electrical business world to become a major industry engaged in the manufacture and sale of radios to the general public. In the course of this change, manufacturers and home-builders alike overwhelmingly turned to single layer solenoids and other types of coils as those most suitable for broadcast band radio frequency applications.

Sales of honeycombs and similar types dropped to a small fraction of the total coil market during the mid 1920s, due mostly to the demand for other types of broadcast receiver coils, but this by no means signaled the end of their use for radio applications. In a rather unexpected turn of events, the universal coil re-emerged from obscurity, and by 1937 was one of the principal choices for use at frequencies below the broadcast band [31, p. 41].

This became more than just a minor market application because manufacturers turned to the superheterodyne circuit. Home receivers of that type used intermediate frequency transformers tuned to a set fre-

quency below the broadcast band, and in the mid-1930s these IF transformers employed universal coils for the primary and secondary windings [31, pp. 567-568]. A similar situation existed for the manufacture of radio frequency chokes, so that by the early 1940s they commonly consisted of two or more universal coils mounted some distance apart on an insulating rod [32].

This trend continued during a progressive miniaturization of receiver components following World War II. For example, a 1955 radio supplies catalog described universal wound IF transformers and included illustrations of them [33]. Honeycombs and duolaterals also survived, as shown by advertisements on the same catalog page. The former were for use as adjustable RF inductors, while duolateral windings were described for filter chokes used to block RF noise, from the AC line. As a result of all of these applications, it can be said that these coil inventions have had a long-lasting influence on the radio industry.

REFERENCES

- Jodrey, Elbert W., *Coil for Electrical Purposes*. Patent 865,907, filed Oct. 26, 1905; issued Sep. 10, 1907.
- Leeson, "Universal Electrical Coil Winding Machine, New Electrical and Mechanical Appliances." *Electrical Review and Western Electrician*, Vol. 67, no. 25, Dec. 18, 1915, p. 1127.
- Electromagnets for Industrial Work, Southern engineer, Vol. 34, No. 3, Nov. 1920, p. 60.
- "The Electrical Exposition and Motor Show of 1916," *The Edison Monthly*, Vol. 9, no. 6, Nov. 1916, p. 239.
- "A Great Anniversary Exposition," *The Edison Monthly*, Vol. 10, no. 6, Nov 1917, p. 203.
- "Trade Notes," *Electric Railway Journal*, Vol. 49, no 21, May 26, 1917, p. 988.
- "Machinery Markets and News of the Works," *Iron Age*, Vol. 106, no. 3.
- Gowen, Robert F., "The History of the Honeycomb Coil," *Radio News*, Vol. 2, no. 5, Nov. 1920, pp. 304, 325.
- Advertisement, Radio Distributing Co., *Wireless Age*, Vol 7, no. 1, Oct 1919, p. 2.
- Advertisement, Radio Distributing Co., *QST*, Vol. 3, no. 3, Oct. 1919, p. 2.
- Advertisement, Radio Distributing Co., *Wireless Age*, Vol 7, no. 4,, Jan. 1920 p. 29.
- Advertisement, Radio Distributing Co. *Everyday Engineering Magazine*, Vol. 8, no. 4, Jan. 1920, p. 234.
- Sterns, Morton w., *Electrical Coil*, Patent 1,490,040, filed Feb. 10, 1919, issued Apr. 8, 1924.
- Sterns, Morton W., *Electrical Coil*, Patent 1,490,041, originally filed Feb. 10, 1919; divided and refiled Dec. 18, 1923; issued Apr. 8, 1924.
- McNicol, Donald, *Radio's Conquest of Space*, Arno Press, New York, 1974, p. 251. Reprint of the 1946 edition by Murray Hill Books, New York.
- Douglas, Alan, *Radio Manufacturers of the 1920s*, Volume 1, Vestal Press Ltd., Vestal, NY 1988
- Boucheron, Pierre H., "A New Inductance," *Radio Amateur News*, Vol. 1, no. 12, Jun. 1920, pp. 684-685, 720-721.
- Kendall, G. P., "Multilayer Coils" *Radio News*, Sep. 1923, pp. 268-269, 306, 308, 310, 312.
- Giblin, Thomas P., *Electrical Coil*, Patent 1,342,209, filed Nov. 12, 1919, issued Jun. 1, 1920.
- Advertisement, Pacent Electric Co., *QST*, Vol. 3, no. 11, Jun. 1920, p. 2.
- Advertisement, de Forest Radio Tel. and Tel. Co., *QST*, Vol. 2, no. 11, Jun. 1919, p. 33.
- Advertisement, Coto. Coil Co., *QST*, Vol. 4, no. 3, Oct. 1920, p. 76.
- Acts and Resolves of the General Assembly of the State of Rhode Island*, January Session, 1920, Appendix, p. 654.
- Anon, "Duo-Lateral Type Inductances." *Everyday Engineering*, Vol. 9, no. 3, Jun. 1920, p. 254.
- Advertisement, Remler Radio Manu-

- facturing Co., *QST*, Vol. 5, no. 11, Jun. 1922, p. 112.
26. Anon., New Apparatus, *QST*, vol 6., no.1, Aug. 1922, pp. 24-25.
 27. *Radio Equipment & Supplies*, Catalog No. 22, 1922-1923, p.39. Robertson-Cataract Electric Co., Buffalo, NY, 1922. Reprinted by Vestal Press Ltd., Vestal NY, undated.
 28. Groves, A. L., "An Efficient and Flexible Receiving Set.," *QST*, Vol 4., no. 1, Aug. 1920, pp. 10-12.
 29. Groves, A. L., "Duo-Laterals and More on Tuning," *QST*, Vol. 4, no. 5, Dec. 1920, pp. 23-25.
 30. Kruse, S., "More about Low Loss Coils," *QST*, Vol. 8, no. 1, Aug. 1924, pp. 39-41.
 31. Terman, Frederick Emmons, *Radio Engineering*, Second Ed., McGraw-Hill Book Co., Inc., New York, 1937.
 32. Terman, Frederick Emmons, *Radio Engineer's Handbook*, McGraw-Hill Book Co., Inc., New York 1943, p.87.
 33. Allied Radio Corporation, *Allied Radio Catalog No. 140*, 1955, p. 138.

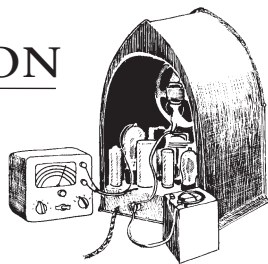
REAL INVENTOR, *cont. from page 53*

- of Engineering and Technology, 2004), while Tapan K. Sarkar, et al. awarded priority to Marconi in their book *History of Wireless* (Wiley, 2006).
- ii "Marconi Wireless Tel. Co. v. de Forest Wireless Tel. Co.," *Federal Reporter*, Vol. 138, 1905, p. 42.
- iii C. Stusskind, "The Early History of Electronics, Part III," *IEEE Spectrum*, Apr. 1969, p. 69-74.
- iv H. G. J. Aitken, *Syntony and Spark – The Origins of Radio*, John Wiley and Sons, 1975.
- v *Ibid.*, p. 123.
- vi S. Hong, *Wireless: From Marconi's Black-Box to the Audion*, MIT Press, 2001.
- vii *Ibid.*, pp. 50-51.
- viii "Marconi Telegraphy," *The Electrician*, Vol. 39, Sept. 17, 1897, pp. 683-7.
- ix S. P. Thompson, "Telegraphy Across Space," *J. Soc. Arts*, Vol. 46, Apr. 1, 1898, p. 453.
- x S. P. Thompson, "The Inventor of Wireless Telegraphy," *The Saturday Review*, Vol. 93, Apr. 5, 1902, p. 425. See also May 3, pp. 556-7; May 10, pp. 598-9, May 24, pp. 666-7; June 21, pp. 805.
- xi S. P. Thompson, *The Times* (London), July 5, 1902.
- xii O. Lodge, *Talks about Radio*, George H. Doran Co., 1925, pp. 51-2.
- xiii O. Lodge, "Reminiscences of the last British Meeting in Oxford, 1894," *Discovery*, Aug. 1926, p. 266.
- xiv *Report from the Select Committee on Radio Convention*, Wyman and Sons, Vol. 8, July 8, 1907, p. 157.
- xv O. Lodge, "Hertzian Waves," *Electrical Engineer* (London), Vol. 14, Aug. 24, 1894, pp. 212-3. (Google "Hertzian Waves by Prof. Oliver Lodge" using quotation marks)
- xvi "The Scientific Work of Hertz, *Electrical Engineer*, Vol. 13, June 8, 1894, p. 661.
- xvii P. Rolands, *Oliver Lodge and the Liverpool Physical Society*, Liverpool University Press, 1990, p. 120.
- xviii *Ibid.*, p. 120.
- xix G. Basalla, *The Evolution of Technology*, Cambridge University Press, 1988, p. 99.
- xx R. F. Pocock, *The Early British Radio Industry*, Manchester University Press, 1988, p. 81.
- xxi Aitken, p. 123.
- xxii W. P. Jolly, *Sir Oliver Lodge*, Associated University Press, 1975, p. 97.

EQUIPMENT RESTORATION

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Submit restoration tips in Word, WordPerfect or plain text files with any illustrations in separate jpeg, tif or bmp files (not embedded in document).



Restoring a Philco 16B – Part 1

Recently I acquired a Philco 16B, the early version with five bands. This radio was the largest “Baby Grand” when introduced in 1933. A massive cathedral with 11 tubes, it is 19½ inches high and weighs 37 pounds. It sold for \$75.00. The set has AVC and a quieting tube to squelch noise between stations. Philco touted this radio as the “most powerful ever designed” so who could deny its worthiness for restoration! I’ve noticed that restoration of Philco radios is well documented, both in printed radio literature, such as Rider’s manuals, and online sites ⁽¹⁾ ⁽²⁾ ⁽³⁾.

I decided to extract what I could from past experiences of collectors with information at the website www.philcoradio.com, and I also found a rather extensive YouTube presentation of 37 video episodes detailing a lengthy restoration project on this exact same radio (4). Though I was initially taken

aback by the seeming lack of expertise of the restorer in these videos, I soon came to appreciate his systematic approach and willingness to attack the most difficult tasks.

One such was rewinding the coil on the moving vane tuning indicator, which he successfully achieved. However, I wouldn’t recommend his technique for unwinding fine wire from a large spool by turning the spool on a shaft. The best way to avoid breakage is to unwind from the end, with the spool stationary. However, overall, he demonstrated that observing and learning is among the most valuable considerations in restoring a radio. He ended up with a well-restored receiver and my respect.

My radio had several obvious problems. The front veneer was badly damaged, with the upper parts missing on both sides. The chassis was in fair condition but it was



Missing veneer was replaced (right) using ordinary wood glue bonded with a household iron after exact placement.



apparent that capacitor replacement was advisable. The main power transformer was suspect as a large amount of wax had flowed out of it in the past. A quick check showed the windings had continuity, so that was encouraging.

I decided that I would follow the YouTube tutorial and other guidance on the Philco.com website and re-stuff all the caps in those Bakelite blocks common to Philco radios of this period. Usually, I initially replace only the main power supply capacitors which are almost always dried out in 30s radios. Then, after making sure there are no shorts across the supply that might damage components, I power up the set and proceed to replace caps as needed to correct misbehavior in different parts of the radio.

Audio coupling caps are always suspect, since small amounts of leakage can disturb the grid voltage of the following tubes. In many cases, I've found that some leaking capacitors are tolerable for a quick fix but am always aware that trouble may be ahead if the leakage becomes large. With this radio, I decided that wholesale replacement was indicated. There was plenty of documentation on values and capacitor placement. Moreover, it's always nice to see the radio look original from below and recognizable in Rider's data.

The replacement entailed removing some obvious earlier replacement capacitors that were mounted here and there as is often encountered in old radios. The set had six replacement capacitors and, judging from their vintage, the set had probably not been repaired after 1950.

Replacement of the front veneer required cutting two matched pieces that cover the arches that butted together at the peak of the radio. I used paper-backed walnut veneer and cut the pieces out to match the grain orientation of the original veneer. Typically I use contact cement as the adhesive when applying new veneer. But in this case I was apprehensive about whether I could place the two pieces to match the butt joint at the top while fitting the two lower straight parts against the lower molding of the panel.



Restored capacitor assembly being slid into topside can.

With contact cement, there is no shifting once the adhesive on the panel and on the veneer come into contact. Instead, I found a way that was new to me, using ordinary white/yellow wood glue (Tite-Bond or Elmer's for example). The glue is applied to mating surfaces of both the panel and the back of the veneer and allowed to dry for about a half hour before positioning the pieces. Then an ordinary iron is used to heat the joint and cause bonding. A cloth is used between the iron and veneer to avoid scorching.

It important to apply the glue in a thin, uniform layer. Use of a sponge paint brush works well for glue application. It may be helpful to apply two coats of glue to be sure that the two surfaces are completely covered. Uniformity of coating and avoidance of lumps of glue is important to make sure that the veneer will lay flat. This is more important than trying to get the glue as thin as possible. With this technique, I was able to place the veneer exactly where I wanted it and then proceed with ironing to get adhesion. Of course I practiced a couple of times on gluing small pieces of veneer to scrap wood.

I purchased 41 replacement caps from one supplier, Just Radios, at a cost of about \$30. This included a few of the mica types for tuned circuits just in case some of these would require replacement. I probably could have scrounged the caps from my existing supply but surely would have had to make some guesses about using values that

didn't match the originals.

Typically, in such cases, I might use a cap bigger than the original for bypass types but would try to closely match original audio coupling caps. Generally, the caps in the tuning circuits are less likely to have deteriorated.

I found it very helpful to make a list of the Philco pictorial numbers on location of the capacitor blocks as well as the capacitor value from the schematic. I used this list continually when making the actual replacements. This cross link of information from the Rider's schematic (capacitor value) and pictorial (capacitor location) expedited the process of replacement.

I removed, re-stuffed and re-installed the capacitor blocks one at a time to lessen the chance of mistakes in reattaching the block. I also paid attention to the schematic to check for previous "strange" modifications that might have occurred in the past and to check for later Philco-recommended changes that might be implemented or were already in place.

The metal chassis itself was in good condition with little rust but had a lot of oil/wax/grime that was tedious to remove. I cleaned some superficial red rust areas using naval jelly, which is primarily weak phosphoric acid. I swabbed this on with Q-tips and after two or three applications for ten minutes or so the rust disappeared. Some light scraping with a pocket knife helped speed this process.

Areas of the chassis near the large power transformer were covered with wax, probably from overheating of the transformer in its previous life. The only expedient way to remove this was by scraping it away as it was tenacious and resistant to household cleaners. Most of this wax was found deposited on the floor of the cabinet.

The tuning mechanism ahead of the tuning capacitor was a mess with accumulated grime and deteriorated rubber. But the assembly was well designed and could be taken apart for repair. Moreover, ordinary 1/8-inch thick O rings are nearly perfect replacements on two of the wheels and their use is documented online (1).

The hardest task was getting the old rubber loose from the brass wheels. A metal pick and ammonia in combination worked well for removal. After cleaning the parts and putting the new rubber on, the dial operated smoothly.

There was a large 2 1/2-inch rubber belt that was still in good condition on my radio. It is located right on the back side of the dial itself and provides an outer friction surface that contacts a 1/4-inch diameter serrated shaft driven by the other parts of the tuning mechanism. I mention this because the YouTube presentation substituted an 1/8-inch width O ring of 2 1/2-inch diameter for this but instead of relying on outside contact with the serrated shaft, the restorer stretched the O ring over the serrated shaft.

Apparently this worked but I suspect that it tended to pull the dial off axis which was a problem mentioned in the video. Another restorer used a small vacuum cleaner belt as replacement but had to slit the belt to the right width and shim it with thin cardboard to get good contact with the serrated shaft, as it was too thin. The original belt was of rectangular cross section so it may not be possible to find the correct O ring size that works and stays in place since there is no underlying groove on the dial metal where it is placed.

However, 3/8" square cross section rubber in straight lengths is available from McMaster-Carr and can be glued into a loop with super glue, a common technique for making rubber rings of custom size. The stock is of the right thickness, though not quite as wide as the original which is closer to 1/4 inch. I judge that it would work okay though.

The original power supply capacitors were in cans mounted above the chassis. They were dried out and completely non-functional but still in place. An earlier repairer had replaced them with capacitors installed below the chassis and these had also deteriorated. I decided to use the original cans for appearance and re-stuff them with new 8 ufd capacitors.

The cans were easily removed and cut open about a half inch from the bottom with

a hacksaw. The dried guts were stripped out and a new capacitor was wired in with (+) and (-) leads coming out the bottom center hole. These cans were originally insulated on the outside from the chassis with cardboard sleeves because the negative side of the capacitor (i.e. the can) was not at ground potential. I retained the sleeve even though I used a separate wire for the negative side and did not connect this to the can but only to the appropriate connection point in the circuit.

I also have discovered that ordinary 1-inch gray PVC conduit pipe fits tightly into most capacitor cans of this vintage. On re-assembly, I used a short section of this pipe to hold the two parts of the can together. This strengthened the can and held it straight. The saw cut was hidden by the cardboard sleeve and the chassis clamp holding the can in place. In the case of a radio without the sleeve or retaining clamp, I might conceal the saw joint with aluminum metal tape.

A bank of five capacitors mounted in a large can above the chassis was disassembled and all the original foil caps were replaced with modern components. The *YouTube* video was useful here because it illustrated how this rectangular can could be opened without disconnecting any of the below-chassis wiring on the five terminals. After removing the five external attachment screws, I slid the top part of the can from the bottom terminal base, snipped each wire leading to a capacitor inside the can and then removed the can containing the capacitors.

The capacitors themselves were wrapped in a durable paper sleeve and it was not necessary to heat the assembly to slip them out. I then mounted the five new capacitors on a phenolic board that was about as wide as the diagonal of the can so that it could be slipped in with the caps on one side of the board, and it had enough clearance so none of the components touched the can. The five retained, snipped wires were attached to the new components on the board and a single ground wire was installed for grounding to the exterior of the can as in the original.

To provide added insulation just in case, I over-wrapped the board/cap assembly with thin polypropylene flashing before installation. I used a product called Moistop PF by Fortifiber to provide added insulation just in case. I believe this kind of product is available at most builder's hardware stores, and is commonly used around window installations as a vapor barrier.

This capacitor replacement technique avoided disconnecting a lot of wires going to the capacitor terminal board on the chassis underside and having to keep track of where they went, which was a big task in the online video, wherein the whole original terminal board was removed from the radio to install the new capacitors.

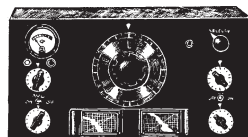
There was one peculiar Philco electrolytic capacitor in the center underside of the chassis with its plus-side case attached to the chassis with an integral ¼-inch machine screw. I replaced this with made-up assembly by using a short shaft cut from a bolt with threads on one end and attached this to the chassis. I insulated the shaft with shrink tube and then used shrink tubing around a new axial electrolytic capacitor and the shaft to secure the capacitor to the shaft. The plus end of the capacitor was grounded to the chassis at the base. The negative end of the capacitor served as the tie point at the other end of the shaft away from the chassis, like the original.

REFERENCES

1. www.philcoradio.com
2. www.tuberadioland.com/philco16_cathedral_main.html
3. www.philcorepairbench.com
4. <http://www.youtube.com/watch?v=PDII4cRIJKc> (The username of the author is Lockemeister)

This concludes Part 1 of our "Equipment Restoration" column. Part 2, in the Winter issue of The AWA Journal, will complete the restoration of the Philco 16B and also include construction information for An Easy-to-Build Zenith Transoceanic Battery Pack.

THE COMMUNICATIONS RECEIVER



BY **BARRY WILLIAMS, KD5VC**, 2002 MUSTANG LANE, ROSHARON, TX 77583
E-MAIL: hroengineer@gmail.com

I thought it would be in keeping with the purpose of this column to mention a few books that might interest the readers. The first four are concerned with radio intercept operations during World War II in the European theater. They are "The Secret Wireless War," by Geoffrey Pidgeon, "The Searchers," by Kenneth Macksey, and "The Secret Listeners," by Sinclair McKay. These are relatively easy to find and are all highly recommended. One excellent book that is difficult to find is "England Needs You," by Joan Nichols. I met Joan at Bletchley Park just after she finished the book, a real treat to talk to someone who had actually sat in front of an HRO for the duration of the war. Two other recommended books concerning the electronic warfare of World War II are "The Wizard War" by R.V. Jones and "Instruments of Darkness" by Alfred Price. These include information on radar, radio navigation, and radar countermea-

asures. One interesting jamming system used diathermy machines!

In this issue we have an interesting article from Crawford MacKeand, WA3ZKZ, concerning a section of an HF military receiver system. You will note that this part of the system has several idiosyncrasies, including tuning by use of a variable inductor. Unfortunately the schematic leaves a few questions unanswered. You will note in the schematic of the HFO section that there is a string of capacitors that are not connected to the circuit, though it appears that there are jumpers to bring them into the circuit. C34 through C41 are, in order, 100pf, 50pf, 40pf, 20pf, 100pf, 50pf, 40pf, and 20 pf. They appear to complete the circuit of the oscillator system. They do not appear to be adjustable from the front panel, and may have been set for proper operation of the oscillator at the factory. —Barry Williams, KD5VC

Royal Air Force Receiver R78

*By Crawford MacKeand WA3ZKZ, ex-G4ARR, VP8CMY
27 Lonsdale Lane Kennett Square, PA 19348*

In 1948, immediately after World War II, many items of electronic equipment, familiar and unfamiliar, appeared on the British war surplus market. Not too many of these seemed particularly useful in amateur or other communications systems, but one exception was the R78. Unusual in that it was not a complete shortwave or HF receiver, but only a "front end," yet it was quite a sophisticated unit with several interesting features. In Royal Air Force service, there had been companion units providing an MF receiver to complement its HF range (2.4 - 13 MHz), also the remainder of the receive systems, and HF and MF transmitters, all apparently airborne, but virtually unknown to the sur-

plus market. For civilian uses what the R78 lacked was an IF strip and detector and audio stages, but by happy coincidence the BC-453, one of the famous command receivers and widely known as the "Q5-er", was well fitted to fill the bill, and was available as surplus at about the same period.

Origin

The R78, and presumably its MF counterpart, was said to have been designed and produced by Standard Telephones and Cables Ltd.(STC) in about 1938 or 1939, possibly at or near its Foots Cray plant in south-east London, or at New Southgate a little further north. STC had since the 1920s

been the British arm of Sosthenes Behn's International Telephone and Telegraph Corp. (ITT), but some of the constituent companies had good positions in the electronic development of the period.

Stage by Stage Circuit Description

There were several features which distinguished the R78 from other receivers of the period, some of which can be seen from the circuit diagram, and some which are rather less obvious. Starting with the single RF amplifier stage, the use of the EF50 tube was unusual. This however was only the start of the R78's idiosyncrasies. It will be noted that although there is range switching for the RF amplifier and mixer grid circuits (2.4 - 5.9 MHz and 5.8 - 13 MHz), there is none for the local oscillator.

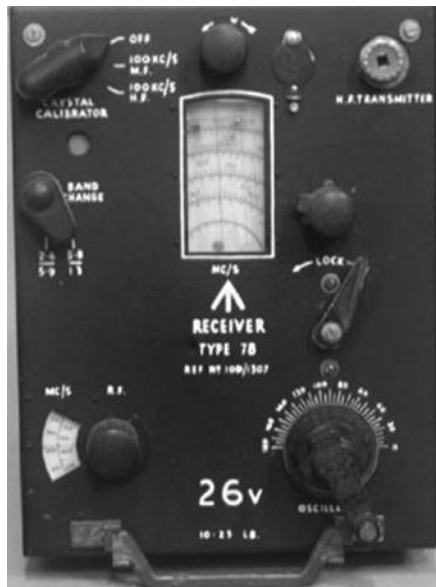
This 6J5G octal triode, or its near equivalent, was operated at such a frequency that its fundamental output was the local oscillator signal for the lower of the two HF bands, while its second harmonic provided for the higher band. Taking for example a single point in the tuning range, the oscillator handled radio frequencies of both 3.2 and 6.96 MHz. At 3.2 MHz signal, the local oscillator frequency was $3.2 + 0.560 = 3.76$ MHz while on the higher range, the oscillator's second harmonic was used, which would be 7.52 MHz and $7.52 - 0.560 = 6.96$ MHz. So the lower band had the LO frequency on the low side, while for the higher band the second harmonic was on the high side.

Not only that, but oscillator tuning was provided by a variable inductance. The tuning coil was rotated by its front panel tuning knob, a variable tapping moving along the coil as it was turned. Remarkably, in almost 50 years of use, the example in my possession developed no rough spots, no noisy patches, and in fact no problems. The coil and its associated fixed capacitors were mounted in a thermostatically controlled enclosure, which while it must have helped frequency stability, was also invisible to this user in operation.

While the RF tuning used a very standard two gang capacitor and dual color coded scale, the oscillator tuning display mecha-

nism was different. A circular disc rotating behind the front panel was geared to the inductor drive and had a helically tracking indicator showing high and low band frequencies against red and green printed markings in a very long spiral, calibrated for both bands. The actual frequency was read against a vertical hair-line. This could be moved from side to side with a front panel mounted cam, so that a fine adjustment could bring the calibration into line with an internal 100 KHz standard, as needed. This helical arrangement provided an easily visible scale at least three feet long for each band, and most unusually for its day, this could be reliably read to within less than 10 KHz.

The mixer was an octal triode-hexode. The triode section was unused, with the plate grounded, it then being common knowledge, and generally true, that pulling of the oscillator frequency by RF tuning circuits was lessened by the use of a separate local oscillator tube. The IF output was at 560 KHz, a value selected when intermediate frequencies were far from standard. In



The R788 front panel. The local oscillator's spiral scale is seen in the central window and RF tuning is at lower left.

the later 1930s US practice had normally settled on 455 KHz, though the famous RCA AR88 used 750 KHz while British designs commonly used 465 KHz for MF operation, with some use of 1600 KHz for shortwave work.

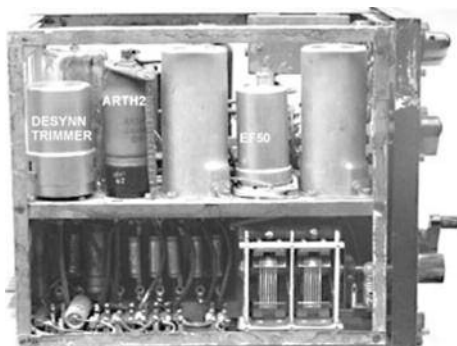
However, although 560 KHz was definitely esoteric, it did happily lend itself to the use of the BC-453 Q5er, which nominally tuned 190 - 550 KHz, but covered 560 KHz well enough at the upper end of its range. The BC453 incidentally had 85 KHz IF transformers, thus contributing greatly to its fame as a very competent sharp-tuning rear-end in the AM and early SSB era. Finally, a triode-connected VR56, equivalent to a 6J7G, was employed as a 100 KHz crystal calibration oscillator, which enabled the user to be reasonably sure of his frequency without the need for a separate wavemeter. This operating luxury was not frequently encountered in other HF communication receivers of the 1940s. Certainly it was much appreciated in the amateur station with which the author was associated during his UK military service from 1950 to 1951.

Tube Complement

The tube complement was VR92, VR91, ARTH2, VR67 and VR56. The VR92, more commonly known as an EA50 or 6D1, was a 1930s design of small VHF diode, somewhat like a “peanut” type, originally built with a 4 volt heater as a 4D1 for television service. It served as protection for the EF50 against grid damage from transmitter breakthrough. Next, the VR91 was the glass-based EF50 pentode, developed by Philips at Eindhoven in Holland just before World War II, the original tooling and samples having been rapidly exported to England just ahead of the oncoming German forces. By late in World War II it was almost a ubiquitous trade mark in British radar designs, manufactured in quantity in the USA by Sylvania, but rarer in HF telecommunications. The presently unknown story of its selection for the R78 would probably be an interesting story in its own right! The ARTH2 (Army Receiving



Top view of the receiver. In the top row are the EF50 RF amplifier, between its coil sets, then the ARTH2 mixer and finally the Desynn Trimmer. Below that is the final 560 KHz IF transformer. In the lower row is first an input filter, then the 100 KHz crystal calibrating oscillator, and finally the 6J5G oscillator tube.



Left side view. Here can be seen the Desynn Trimmer and ARTH2, with the EF50 and its tuning coils, with the two gang RF stage capacitor beneath.

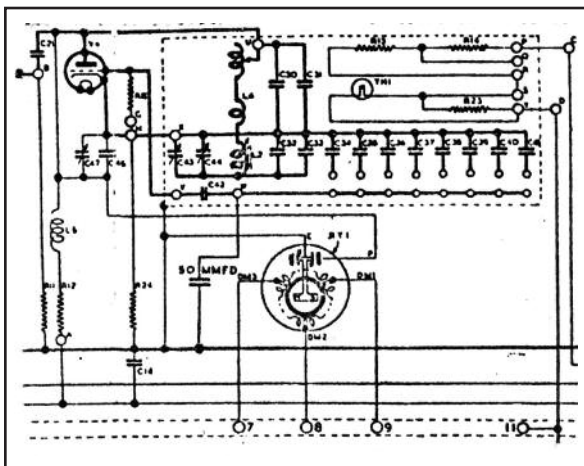
Triode Hexode!) mixer, akin to the 6K8G, was commonly known in Europe as the ECH35, or in the UK services by several CV and VR synonyms. The VR67 was a 6J5 equivalent, while the VR56 was known also as a 6J7 or an EF36.

The tube nomenclature is sufficiently exotic to warrant some comment. Before about 1945 the British Army and the Royal Air Force had their own systems. In this circuit, the RAF variety held most sway, with the VR92, VR91 and VR67. VR stood for “Valve, Receiving”, transmitter tubes being VT numbered. The Army was more precise.

An ARP12 for example was a common battery powered Army Receiving Pentode, and it is surprising at first to see the mixer in the R78 labeled as an ARTH2. This may reflect STC origins, as ITT also owned *Brimar*, a notable British tube manufacturer and a major supplier of octal types, so their stocks of the popular mixer may well have been those first specified by Army stores. The EF50 was not often known by other names, although in the British Army it was, by 1950, usually a CV1091, reflecting its earlier incarnation as an RAF VR91. Many of the inter-service Common Valve or CV designations were derived directly from RAF numbers by simply adding 1000 to the VR type number!

The Desynn Trimmer

One final feature of the R78 deserves further mention. While in many aircraft installations, a tunable non-channeled radio would have been under the control of the radio officer, some control by the pilot would also have often been desirable. In the R78 this was provided for by the Desynn tuning unit DT1. The pilot or other remote user would have been provided with a special wirewound potentiometer connected most likely to the 26 volt aircraft power supply. It controlled the Desynn, which looked somewhat like a bulky octal-based metal tube. This device had a permanent magnet rotor, the position of which was re-



Local oscillator circuit. The variable inductance tuning coil is seen at upper center, while below is shown a row of capacitors, possibly link-selected during manufacture. The Desynn Trimmer can be seen at the bottom of the diagram. At top right can be noted the heater resistors and thermostat for the oscillator oven.

motely controlled by the potentiometer, thus setting the position of a small trimmer capacitor. One assumes that Desynn is a contraction of DC Selsyn.

Acknowledgments

An article by Geoff Atter G3GRO, describes the R78, though concentrating on the BC-453 as its worthy accompaniment. The Australian Kurrajong Radio Museum has a description of the AR15206/R78 on its web site <http://www.vk2bv.org/museum> and I am indebted to Ian O'Toole VK2ZIO for his kind permission to use copies of the photos on that site. An excellent related history of the development of the EF50 can be found on Ron Dekker's web site at <http://www.dos4ever.com/EF50/EF50.html>.



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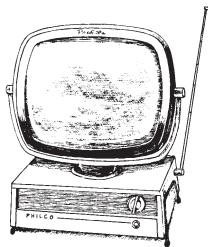
Classified Ads will return in the next issue.

TELEVISION

EDITED BY **RICHARD BREWSTER**, 145 LITTLE PECONIC BAY ROAD,
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RCA's "TV Eye"

"Based on the vidicon tube, developed by RCA, a new instrument is on the way for homes, business, and schools—the RCA "TV Eye."



So reads an August 1953 advertisement from RCA ⁽¹⁾. RCA had announced the development of the vidicon in 1949 and given a demonstration of the newly developed camera to the IRE on March 7th, 1950. The vidicon camera tube, had been in intense development since the late 1940s. It utilizes a photoconductive target and, together with a low-velocity scanning beam, operates as a storage tube.

The optical image focused on the target induces a pattern of varying conductivity which matches the varying brightness pattern of the image. The pattern is converted to a video signal as the scanning beam passes over it ⁽²⁾.

The vidicon has rather high sensitivity, permitting the televising of scenes with as little as 100 foot-candles. Its spectral response is similar to that of the human eye ⁽³⁾.

During my career at Westinghouse, I worked with a group of enthusiasts in
(continued on page 72)

First home television camera, RCA's "TV Eye," connects to any TV set—lets you watch children in the nursery or at play.

Tireless "TV Eye"

New RCA TV camera an alert watchman for home, school, industry

Based on the vidicon tube, developed by RCA, a new instrument is on the way for homes, business, and schools—the RCA "TV Eye."

Light, compact, easy to use, "TV Eye" is a camera unit which can be connected to standard home receivers—makes any of the 25 million TV sets now in use a potential closed-circuit television system.

RCA's industrial version of the vidicon camera has already proved its place as an observer and guardian in science, industry, transportation, business—with new uses still being explored. Wherever distance or danger preclude a human observer's presence, the vidicon camera can take his place and stand watch.

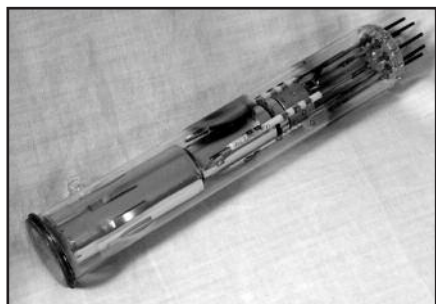
"TV Eye" plugs easily into standard TV sets. You just switch to the selected channel, and see everything that the camera sees.

RCA vidicon camera is a bank, lets tellers verify the signatures on checks by television.

RCA "TV Eye" gives schools a private TV network, takes talks and demonstrations to classrooms.

In a school yard, RCA vidicon camera lets employees check out numbers at long range.

RCA **RADIO CORPORATION OF AMERICA**
World leader in radio—first in television



The 6198 Vidicon. R. Brewster photo.



The TV Eye system.

MINI TOUR OF THE NEW MUSEUM



Staff gathers at front of museum in preparation for grand opening. Richard Neidich photo.



Artifacts and resting benches line main corridor. Front doors are in background.



Museum gift shop is located just inside the front entrance.



Showcase at front of museum has artifacts tracing the origins of radio communication.



History wall documents radio giants and their achievements.



The 1920s radio store exhibit.



The Heathkit collection is virtually complete.



A corner of the television exhibit.



Part of the Marconi ship's wireless station.



A corner of the amateur radio exhibit.



Early phonographs make an interesting grouping.



Wireless gear from the era of spark.

the Pittsburgh Antique Radio Society who were documenting the history of pioneer radio station KDKA. We were assisted by Westinghouse historian Charlie Ruch, who made it possible for us to visit a deserted shack on the roof of the disused Westinghouse East Pittsburgh Building K.

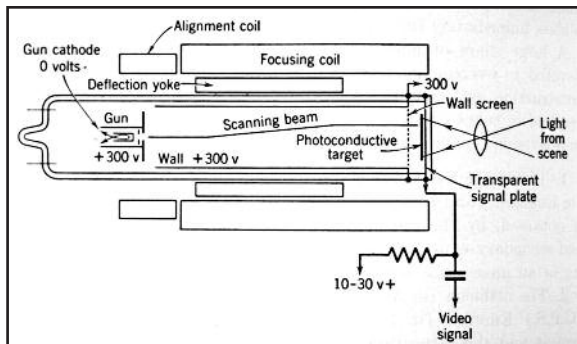
In this structure, possibly the location of the first KDKA broadcast, was found a discarded RCA TV Eye! Appreciating my interest in television, Charlie offered it to me. This equipment has resided in my collection for over 20 years.

The two-piece TV Eye system employs, in the camera section, three tubes plus the type 6198 vidicon. Type 6U8s provide three stages of video amplification as well as an RF oscillator and modulator. Sync is introduced by a section of a 6U8 acting as mixer. The RF video output is tunable from channels 2 to 6. The camera is attached to the seven-tube control unit by a 20-foot 24-conductor cable.

The control unit has a transformer-type power supply delivering 250 volts, regulated 150 volts, and negative 120 volts. While the vertical oscillator is locked to the 60-cycle line, the horizontal oscillator is free running. Amplifiers provide drive to the vidicon deflection yoke. The image is non-interlaced. A protection circuit dis-

ables the vidicon drive at the loss of horizontal or vertical sweep. Tube lineup is three 12AT7s, 12AU7, 6BQ6, 6AS6 and OA2. Interestingly, glass 1N34 diodes are to be found throughout the circuitry.

I replaced many capacitors as well as the rectifier in the -120 volt vidicon 'beam' supply. Of course, I should have replaced



Schematic arrangement of the Type 6198 from an RCA data sheet (Ref. 3).

all of the 60 year-old capacitors, but the very compact construction of the control unit made that very difficult. Interestingly, the camera unit appeared to have incorporated much higher quality capacitors. I replaced none of those. Finally, I had to drag out my old 3" Tektronix to verify waveforms. I spent a lot of time trying to get stabilized vertical sync until I replaced a previously unsuspected leaky capacitor in that circuit.

What a joy when I finally got a decent picture, and without much illumination—the 6198 was still good! Nevertheless, it took a lot of tweaking of the beam, target, and stability controls to get that 'decent' picture. Certainly a far cry from the lovely pictures provided by our 'smart' phones!



Image produced by author's TV Eye. R. Brewster photo.

REFERENCES

1. "His Master's Voice" In America, General Electric Company, 1991, p. 240.
2. Television, V. K. Zworykin and G. A. Morton, 1954, pg. 258.
3. RCA data sheet, 6198-8-54. 1952.

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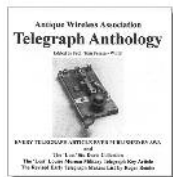
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Part of the 1920s radio store at the new Antique Wireless Association Museum. Richard Neidich photo.



Vintage ham gear at the new Antique Wireless Association Museum. Richard Neidich photo.